Electricity on the Farm

A Monthly Magazine for the Progressive Rural Family

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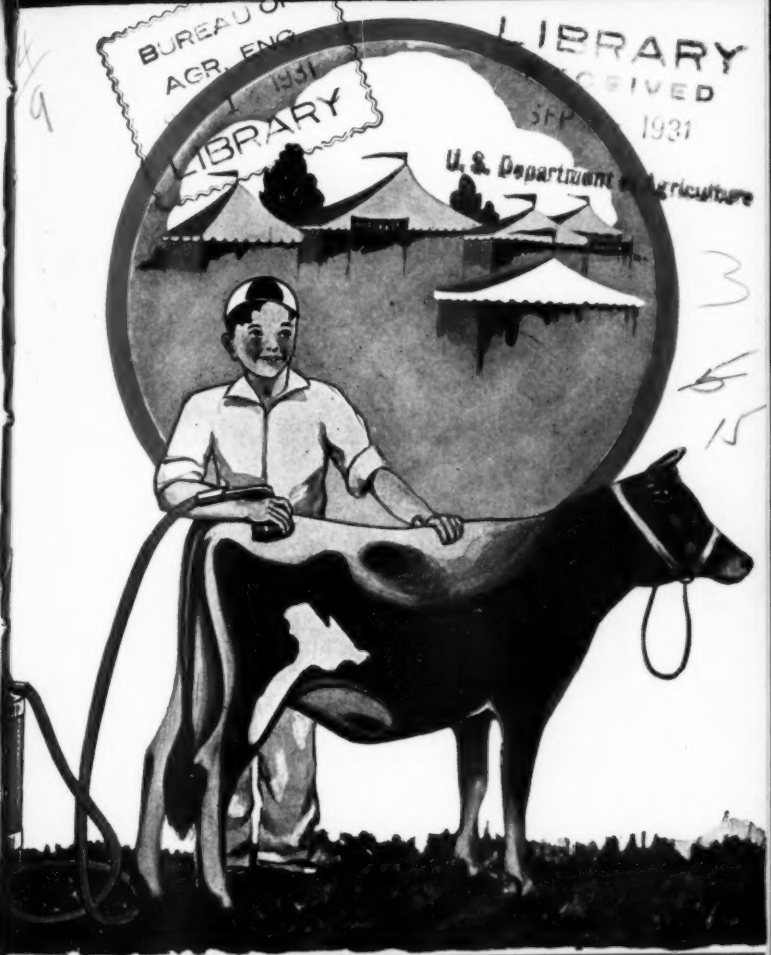

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Hotpoint

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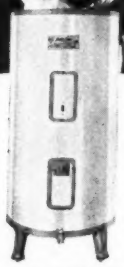

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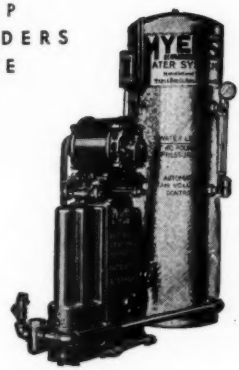

Fig. 2621

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Electricity on the Farm

SEPTEMBER, 1931
Vol. 4 No. 9

Page

Editorial 7

Poultry House Lighting 9
BY GEO. W. KABLE

Keeping the Family in Hot Water 13
BY E. R. MEACHAM

What Can Electricity Do for the Dairy Farm? 17
BY PROF. L. J. SMITH

Grinding Own Feed Proves Profitable 21
BY A. R. LOYD

More Comfort at Less Cost 24
BY J. M. HERREN

Electrical Housekeeping 28
Conducted by GAIL MEREDITH

Questions and Answers 36
Conducted by H. J. GALLAGHER

What Our Readers Say 42

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Two Large Ovens

IN THIS

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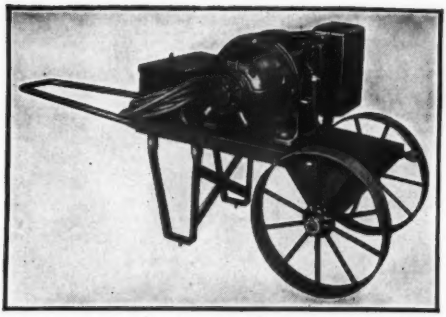

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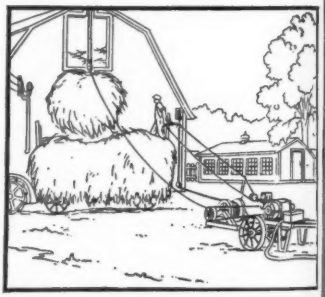

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204-27

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

SEPTEMBER, 1931

Now autumn's fire burns slowly
along the woods,
And day by day the dead leaves fall
and melt.

—WILLIAM ALLINGHAM.

WHY is it that autumn as a season is called "the saddest of the year?" Does it not mark the end of the period of hardest work on the farm? Is it not the season of fruits, of harvests?

Is there then cause for sadness, for melancholy?

Yet the greatest of poetic minds seem to have experienced depressed spirits upon its arrival. Alfred Tennyson wrote:

"Tears, idle tears, I know not what they mean,
Tears from the depth of some divine despair,
Rise in the heart, and gather to the eyes,
In looking on the happy Autumn fields,
And thinking of the days that are no more."

And our own beloved American poet, William Cullen Bryant, expressed this feeling toward the fall in this manner:

"The melancholy days are come,
The saddest of the year,
Of wailing winds, and naked woods,
And meadows brown and sere."

Truly, autumn is the forerunner of winter, but it has its many contributions to happiness on the farm. Besides its harvests, it marks the reuniting of the family in closer bonds through greater leisure time and through common preparation for the winter. Making provision for the comfort of the household in the coming cold weather, through getting in the fuel supply and tightening up the farm buildings against stormy weather, by the men, and replenishing food supplies, through canning, by the women, strengthen the family bonds in the farm home. And then there are Halloween, Thanksgiving day and Christmas, the happiest of days on the farm, to look forward to.

All in all, autumn seems to be entitled to far more praise than it has been given in the past, and particularly on the moderized farm where the newest of conveniences and comforts are now to be found.

Proper Lighting of Poultry House Does Pay

This farm maid of West Lafayette, Indiana, seems well pleased with results obtained by the use of artificial lighting for poultry houses, particularly during these fall months when production normally lags.

Poultry Houses – Lighting

POULTRY HOUSE LIGHTING

By GEO. W. KABLE

FALL and winter lighting for laying hens is one of the established uses of electricity for profit on the farm. Lighting should be of especial interest this fall when any means for increasing profits will be welcome.

The main purpose of lighting is to stimulate production at a time when prices are highest. This period usually starts in the fall while hens are still in the moult and pullets are not normally in full production, and continues until February or March. This is also the period of short days and confinement for the hens. With the advent of spring, nature provides conditions which encourage egg production, and prices drop. It is probable that all the phenomena which activate plant and animal life in the springtime are not fully understood. We do know that spring brings lengthening hours and greater intensity of light as the sun moves northward over us.

Requirements

Lights supply some of the elements of spring. Poultrymen generally assign the increase in production by lighting to longer hours for the hens to feed and exercise. While this time element undoubtedly has a direct bearing, it is the writer's opinion that the stimulating effect of the light itself has been underestimated.

Good hen house lighting calls for:

1. A program which combines lighting with correct feeding and management.
2. Adequate illumination properly distributed.
3. Some means for controlling lights automatically.
4. Judgment in using the lights to accomplish the specific purpose desired.

Fowls which are to be lighted require the same careful management as any animal from which maximum production is expected. More eggs call for more feed in a ration, especially balanced for egg production. Fowls which are to be increased in body weight rather than egg production require different feeding. Formulas for such rations may be secured from any of the state agricultural colleges. It is doubtful whether the use of lights is justified on small flocks which have the run of the farm. On the other hand, the farmer who is applying himself to the handling of his flock as a profitable side line will find lights a very good investment.

Investigations at Oregon State College[1] indicate that the best returns from the use of lights are obtained from the fowls which are in the best condition to lay. Fully matured pullets gave greater increases in profits than immature pullets or old hens.

Adequate illumination requires sufficient brilliance and intensity of light to attract the hens down off the roost and enable them to see feed readily. The greatest amount of light should be concentrated on the floor, feed, hoppers, and drinking fountains. Some direct rays of light should also fall on the roosts.

Houses which are from 16 to 24 feet wide and in units of 20 feet or longer may have the lights hung from the ceiling, half way between the front of the house and the front edge of the dropping boards. For this type of house, the Cornell Experiment Station[2] recommends using 40 watt lamps placed ten feet apart and six feet above the floor.

In houses which are not of the conventional type or in which dropping boards, nests or other equipment interferes with the distribution of the light, this center placing and uniform spacing may not be desirable. In such cases, bear in mind that the purpose of

(1) Electric Light for Increasing Egg Production, Oregon Station Bulletin 231.
(2) Artificial Illumination of Poultry Houses for Winter Egg Production. Cornell Bulletin 90.

the lights is to get the fowls down off the roosts and to expose them to the rays of light and enable them to see the feed. Any placing of lights which will accomplish this purpose will be satisfactory. Some placings of lamps will be more costly than others because of the larger number of light units required, more complicated wiring and greater power consumption due to inefficient distribution. Many of the power companies have rural service men who will give helpful suggestions with such special problems.

Light Intensity

Opinions vary regarding the intensity of light required. Cornell's recommendation of one 40 watt lamp and reflector for each floor area of 10 ft. by 10 ft. has been followed satisfactorily in many houses. When lamps and reflectors are new and clean, the resulting illumination is good. If the cost of power is not a major consideration, 60 watt or even 100 watt lamps would be desirable.

A height of 6½ ft. above the floor will give sufficient clearance to walk under the lamps and provide a good lateral distribution of light. Lamps placed high above the floor do not give as great an intensity of illumination on the floor but they throw light over a larger area. A lamp at 6½ feet, for example, will give more than twice the light intensity on the floor as when placed at a height of 10 feet.

Reflectors are desirable to get the full benefit of the light. Without reflectors, as much as 30 per cent of the light radiates upward and is lost. A good reflector also diffuses the light and tends to reduce shadows. Either the flat dome or R. L. M. dome reflector is good. The lamp wattage should be given in purchasing reflectors in order to get the reflector which will give the best distribution for that particular size. The R. L. M. dome diffuses the light better on the floor but does not give as strong illumination on the roosts.

Dark corners and shadows are undesirable. Birds may wander into the dark corners and roost there. Shadows of the birds themselves are best avoided by placing a number of lights down the center of the house.

Some means for turning the lights on and off at the proper time automatically is desirable for the sake of regularity and to avoid going to the poultry house at night. The type of switching device depends upon when the lights are to be used.

Three systems of lighting are in common use. The one which is most prevalent and simplest is to supply artificial light in the morning only. The total length of light day is regulated by the time at which the lights are turned on in the morning. This turning on time should be adjusted each week as the days get longer or shorter. A simple time switch is all that is needed to turn on the lights, or an ordinary alarm clock may be used for the purpose.

Some poultrymen prefer to use lights both morning and evening. Where evening lights are used, it is first necessary to dim the lights before cutting them off entirely in order that the hens may see to get on the roosts. This dimming is accomplished by special dimming devices or by multiple contact time switches which turn off part of the lamps at a time, or switch from a "bright" circuit to a "dim" circuit, then off.

Morning and Night

A third method of lighting is popular in some sections. This consists of a combination of morning lights with a night lunch provided about nine o'clock or later. To give this lunch, the lights are turned on full which brings the hens off the roosts for about an hour for feeding, after which the lights are dimmed and they return to the roosts.

Morning lights will be quite satisfactory on most farms and they are easier to manage and cost less for control equipment and wiring.

A fourth method of lighting has been tested by the Ohio Experiment Station and reported in a recent bulletin. In this method a dim light—25 watt lamp for 200 hens—is kept on all night. Only about 20 per cent of the hens are

off the roost at a time. They do not feed much at night but they do drink more water and the increase in production is reported to be about the same as for the other lighting methods.

The technique of lighting is fairly simply but there are a few points which should be kept in mind.

The total number of eggs which any hen will lay in a year is largely an inherited characteristic and a matter of feeding and handling. Her "miles per gallon" depends on her own machinery and the quality of fuel and care. Light is the "throttle" which regulates her spring and winter speeds. In order to get the best results the hen machinery should be in good running order—good body weight, healthy and "well oiled." Opening the throttle speeds the hen even if she is hitting on only two or three cylinders, but she will go better of course if hitting on all four.

Thirteen to fourteen hours of light per day is the commonly accepted practice for layers. Breeding flocks are not usually given more than twelve to thirteen hours of light.

The length of light day may be increased gradually or abruptly with good results. The response of the flock will be almost immediate. If the lights are to be cut off during the short days the lighting time should be gradually decreased to prevent throwing the fowls into a moult.

Pullets and hens which are to be used for breeders the following year should be given ample time to moult and rest. The production of strong, early season hatching eggs may be stimulated by using lights on the breeding flock if it is in good condition and up to normal body weight.

Hatchability of Eggs Depends Upon Condition of Hens

A search of Experiment Station results and opinions of poultrymen leads to the conclusion that hatchability of eggs is largely a function of physical condition of the fowls. If layers are on the up grade or at the peak of production, hatchability is good. If on the down grade, the hatchability is poor. Lights judiciously applied about a week before hatching eggs are to be saved will help put the hens on the up grade.

Light apparently hastens sexual maturity of late pullets. Such immature flocks placed under lights

Environment Has a Lot to Do with Condition of Flock

should be fed first to increase body weight before forcing with a laying ration.

Should the weather be cold enough to freeze the drinking water during the lighting period, electric water warmers should be used. The experiment stations in Oregon and western Washington have found that fowls will drink more water when it is warmed to 50-70 degrees, and that it has a beneficial effect on production.

The Ultra Violet Lamp

Several new developments have been made recently in equipment for poultry house lighting. These are not yet commonly accepted but they offer possibilities.

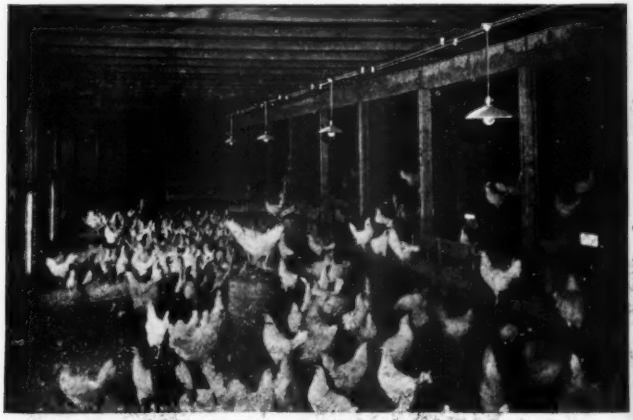
The S-1 lamp is a 400 watt, mercury vapor lamp which is rich in ultra-violet radiation. It is similar in appearance and size to the ordinary 100 watt lamp but must be used on a low voltage circuit with a special transformer. Poultry house units are now being manufactured by several companies Tests made with this lamp by the Case & Elling Farm in Concordia, Mo., gave increases of 49 per cent in production over an unlighted flock last winter.

An S-2 lamp, similar to the S-1 but of 125 watt size and a little higher ultra-violet efficiency is being placed on the market this year. Another lamp known as the CX lamp is also being offered for sale. It comes in sizes of 60 watts and 500 watts. It differs from ordinary mazda lamps primarily in using a kind of glass which passes more of the active ultra-violet rays. This is a relatively weak source of ultra-violet in comparison with the S-1 lamp but has the advantage of being adapted for use in the ordinary lighting circuit.

The effectiveness of ultra-violet light for preventing and curing rickets in chicks has been amply demonstrated. Its use on laying hens is newer. The effect noted on hens is one of maintaining vigor and reducing mortality.

Regulating the Light

Photo electric cells are now available which may be used in combination with a time switch for maintaining a uniform minimum light intensity throughout any desired length of day. When night comes or clouds darken the hen house the "electric eye" will switch on the lights automatically. This refinement of operation is still rather costly for the average poultryman but offers promise for the future.



Typical Lighting Installation in Hen House

Keeping the Family in HOT WATER

By E. R. MEACHAM

THE teakettle is no longer big enough to keep the family in hot water. Once you get running water at the sink, at the laundry tubs, and in the bath room, you are going to want a lot of that water hot. There are various ways of managing it. In the winter time a coil in the furnace or a water front in the wood burner of your electric range will keep a tank of water hot. Then there are oil burning heaters that will warm a tank of water for a bath, or keep a steady supply of hot water in storage for your use. And there are practical, reliable electric heaters to fit most any need.

Perhaps you have never seen an electric water heater. They are not so common as electric refrigerators, nor so old as electric ranges, but they do an equally important job in modernizing the household. Plenty of hot water always ready at the turn of a faucet cuts down the time and labor of dish washing, lightens the task of scrubbing floors, helps with the work of washing clothes, to say nothing of the luxury of warm baths for all the family. Like the sunbonneted Dutch woman clumping forever around the yellow cans of kitchen cleanser, it "chases dirt."

Types of Heaters

Most electric heaters are heavily insulated tanks with heating coils either inside the tank or clamped tightly around the outside. They come in all sizes. Some of them are only large enough to hold three gallons of water; some will hold one hundred and fifty gallons. The heating elements vary, too. You can put a 600 watt heater in a tank; or you can have one of 5000 watts, just as you like. It all depends on your particular needs. If you want a little water in a hurry, you can get a small tank with a big heating element. If you need a good deal of water, you must have a bigger tank, of course. For the ordinary household demands, when you are in no particular hurry, but are wanting hot water most any time, you can keep a supply always on hand by having a smaller heating element in a larger tank, and running it for a longer time. This is quite often the most satisfactory and most economical way of keeping the water hot.

Every successful water heater must have good insulation. Proper insulation keeps the heat in the water from escaping through the walls of the tank. Even when the water inside is too hot to touch, the outside of a well insulated tank is barely warm.

Dressing Up the Heater

On some heaters this insulation is encased in a cloth jacket painted to match the walls. On others there is a metal shell outside the insulation. Some manufacturers are responding to the demand for color by building their heaters into attractive square cabinets with enameled table tops to work on.

Dressing up the water heater to fit into the modern kitchen was a necessary move because the kitchen is so definitely the right place for most heaters. It is more important to have a short length of pipe from the tank to the kitchen sink than to the bathroom or laundry tubs. You use hot water in the kitchen more frequently than at

either of the other places. And, often, even if you need only a cupful, you want it scalding hot. Before you can get the hottest water right from the tank, you must draw off and waste the water that has been standing in the pipe. Just that much more cold water will enter the tank to take its place. The shorter the distance between sink and heater, the less that waste will be.

In the laundry and the bathroom, on the other hand, you use hot water less frequently though in larger quantities at a time. Ordinarily you want it tempered with cold water, anyway, so you will use the water that has been standing in the pipes.

Making the Heater Efficient

When you are talking over the job of putting in the water heater with your plumber, it is well to make sure that he is alert to all the ways that save you money and increase the efficiency of your heater.

The pipes from the heater to the faucets should not only be as short as possible, but they should also be small in diameter. A small pipe holds less water, and it radiates less heat. To keep the hot water from circulating, the pipe should turn down as soon as it leaves the heater. It will take a reverse turn to deliver the water above the heater, but the two bends form a sort of trap around which the hot water is not so apt to circulate.

Do not let your plumber hook up the heater to a hot water circulating system with a return to the heater, because circulating the water from heater to faucet and back again will add to the cost of heating water enough for your household. Much heat will be given off by the pipes, too; they will act just like the radiators of a hot water house heating system.

It will also save hot water and keep down your electric bills if you get him to put self-closing spring faucets on the hot water line. No one can go off and leave the hot water running with faucets like this.

Leaking faucets cause a surprising waste of hot water. This is well illustrated in the table of costs on electric water heaters. At home No. 6 the faucets leaked. You will notice that that heater had to supply just twice as much water and used just twice as much current as the average.

No housewife could mind having the electric water heater in the kitchen, because it is not subject to the drawbacks of some heaters. It can be packed into any out of the way nook because it requires no attention or adjustment, and it, therefore, needs no room for some one to work around it. Since there is no flame, there is no fire hazard and there need be no provision for draft or flue to carry away the smoke and fumes. It requires no fuel so there is nothing dirty, sooty or greasy about it. And best of all, it is a pleasant companion in the farm kitchen these hot days, because it does not heat up the room.

There are various ways to operate these heaters. The very simplest is to put a switch in the kitchen. Before you want the hot water you turn the switch on.

ELECTRIC WATER HEATERS ON OHIO FARMS

No.	No. in Family	Tank Capacity	Total K.W.H. Used	Monthly Average K.W.H.	Monthly Average Gallons Water	Average per Person Monthly K.W.H.	Average per Person Gallons Water Daily
1	6	60	1564	224	780	37	4.3
2	5	60	964	260	915	52	6.1
3	4	90	716	239	835	58	7.0
4	3	52	602	150	525	50	5.8
5	2	60	180	180	630	90	10.5
6	3	60	421	421	1475	140	16.4
Ave.	4	...	...	211	737	57	6.7

When the tank is hot or when you have all the water you need, turn it off again. When the rates for electric service are such that a large additional load makes added expense and where there is other equipment that need not be used while the water is heating, this hand switch may be what is called a "double throw switch."

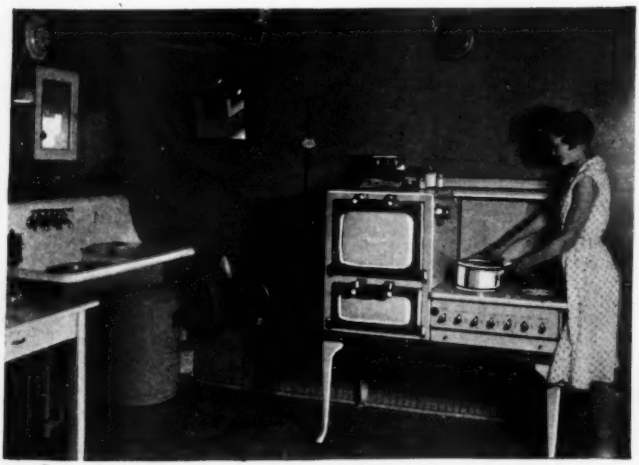
Controlling the Heater

The water heater is connected with one side of it and the range or other equipment to the other side. The current from the line comes to the point in the center where the switch blades are attached. When the switch is thrown one way, the water heater is turned on, and the other things are turned off. When it is turned the other way, the water heater is off. While this may be the most economical method, it means that some one must always attend to it.

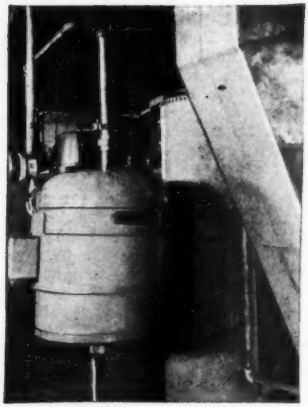
A somewhat more convenient control is the "Time-o-Stat." It is a clock work device with a dial marked off in minutes. When you have learned by experience how long it takes your heater to warm enough water for dishwashing or a bath or a shampoo, you just set the "Time-o-Stat" for that number of minutes, and forget it. Setting it turns on the heater, and when it has ticked off the time you have chosen, it turns off the heater by itself.

But to have hot water ready at all times without waiting for it to heat, you can put a thermostat on the tank. The thermostat cuts off the current just as soon as the water is hot. You may have it set wherever you like; 150 or 160 degrees is the common temperature. The thermostat prevents any waste of current—and it saves the good temper of your family by keeping a generous supply of hot water always on hand ready for use.

There is still another way of controlling an electric water heater which like the double throw switch, depends upon the utility company's rate. Some utility companies that serve big industries during the day and have a heavy lighting load during the evening, have very little market for their current during the night. They cannot entirely shut down their steam plants, and if their ponds are full, they cannot



This heater is right under the kitchen sink



This heater has a switch you can turn on by hand.

save water until the next day. It will flow over the top of the dam and be wasted. So they offer current for steady, continuous jobs like water heating during the night at very low rates.

These are called off peak rates because they do not apply during the peak of the load when every body else is using current.

To provide for off peak service an extra meter is necessary, and to make sure that the current will not be used during the peak, the water heater circuit is controlled by a time switch. Different companies set it at various times, but in general, it is from nine or ten in the evening to six or seven in the morning, with sometimes an hour just at noon.

The actual dollars and cents cost of keeping the family in hot water, depends, of course, on how much they use, how hot they want it, and the rate for current. Knowing your rate, you can estimate the cost for yourself if you will remember that one kilowatt hour of energy will raise four gallons of water about 100 degrees. That is, if the cold water from your well comes to the heater at 50 degrees, it will take only one-fourth of a kilowatt hour to heat a gallon of it to 150 degrees.

If that is hot enough for your use, all you need to do is to divide the number of gallons you will use by four, and then multilpy by the rate you pay for a kilowatt hour.

The records set down in this table were taken on six Ohio farms. Did you notice that the hot water used for all purposes in the house required less than two kilowatt hours for each person a day?

Protection Against Fire

WHEN E. G. Clark, near Rock Creek, Kansas, recently discovered the roof of his house on fire, there was no water at hand, but outside the house were two 10-gallon cans of milk ready to be taken to the creamery. With four pails of this fluid he and his son were able to extinguish the fire and save the residence. Although farm water systems may not generally be given credit in insurance ratings, Farmer's Bulletin No. 1643 (U. S. Dept. of Agriculture) states that they may be of great value if a fire is discovered in its incipient stage, and it undoubtedly is wise, when a pressure system is installed, to provide a few well-placed hose connections. During a July 4th celebration at the Pennsylvania farm home of Joseph Webb, a rocket lodged under a shingle of the roof and started a fire. As the hose was placed ready for an emergency, the fire was quickly extinguished. A 210 gallon capacity water system was instrumental in saving for Chris Anderson, near Bisbee, North Dakota, the loss by fire of all of his buildings. Fire broke out in the garage at 1:30 A. M. and while nothing could be done to save this building and his car, they were able to prevent its spread to other buildings. At the Four Pine Dairy Farm, near Hinsdale, Illinois, proper pressure and sufficient supply of water enabled them to put out a serious fire in one of the buildings when a few minutes delay would have meant the destruction of most of the farm buildings.

Electricity on the farm

What can Electricity Do for the DAIRY FARM?

By PROFESSOR L. J. SMITH
Head, Department of Agricultural Engineering, State College of Washington*

THERE is a rapidly increasing number of dairymen in the Pacific Northwest who have their ranches pretty completely electrified. One of the most outstanding examples is without doubt the Middale Guernsey Farm, on the Portland-Seattle highway, about eight miles north of Vancouver, Washington.

The owner, Mr. Arthur S. Moulton, did not know of my coming, but made every effort to have me inspect everything on the place, even the poultry house and the basement of the well planned home, where no hard fuel or ashes had ever dirtied up the smooth, clean concrete floor. The hot water house-heating system uses fuel oil atomized into the fuel box by electricity, and has automatic thermal control. The one and one-half story house (38 x 40) requires around fifteen hundred gallons of fuel oil annually. At seven cents a gallon, a little over one hundred dollars secures a uniformly heated house, with no fuel to carry in or to feed into the furnace, and no dust and no ashes to carry out. The owner's home has lights, electric range, refrigerator, toaster, vacuum cleaner, electric iron, percolator, washing machine, curling iron, electric water heater (1000 watt), electric fan in kitchen ventilation flue, radio, and no doubt a number of other small electric appliances that the writer did not see. The hired man's bungalow has an electric range, 750 watt water heater, and many electric conveniences, all except the water heater being metered so that the owner could charge the hired man for the electricity he used.

*Secy., Washington Committee on the Relation of Electricity to Agriculture.

Yard Lights

The wiring between the two houses and the barn attracted my attention at once. There were two yard lights suspended from a pole in the center of the space, one operated with a double switch between the barn and the owner's house, and the other with switches at the hired man's bungalow and the barn. A good yard light wired both to the house and barn is money well invested on any farm.

The poultry house has lights, electric brooders, and an electric water heater for cold weather.

The cows were milked by machine. The barn had a feed cutter and a hammer mill driven by a 5 H.P. electric motor, which also operated the power hay hoist. The cows were groomed by electricity.

The milk was dumped into a receiving vat and flowed by gravity over a milk cooler, having cold

water in the upper half and brine pumped by a small motor from the refrigeration system, in the lower half. The bottling was done by an electrically driven bottling machine and the cases were put in a convenient room also cooled by the refrigerator.

Solving Refrigerator Problems

"I had the most difficulty with the refrigerator. The refrigerator people and I worked it out together. I make enough ice for truck deliveries," explained Mr. Moulton, pointing to the pans near the floor at one end of the cold room, which was about 5 x 6 ft. "I made one mistake in making the ceiling too high. There is no advantage in having it much above the top of the door. You can't pack cases way up there and it costs more to build and to insulate the larger space and more to keep it cool. Keep the ceiling low."

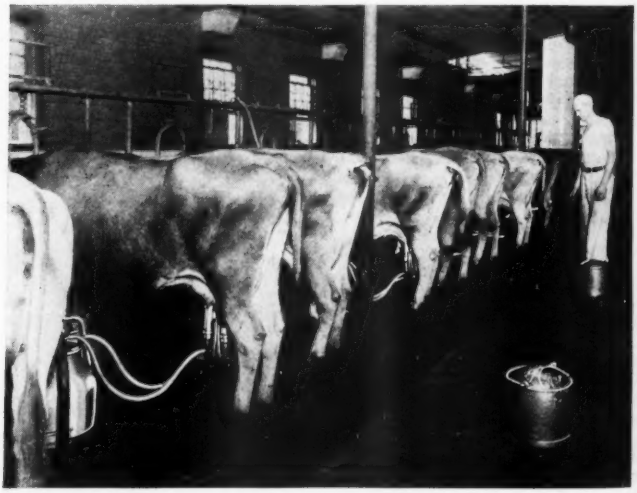
The washing section of the milk house was also interesting. By the sink was a three-brush electric bottle washer, and close by an ample well-insulated hot water tank, heated with a 1000 watt heater. "The only place I don't use electricity in the milk house is for steam," said Mr. Moulton. "We sterilize by steam, and there is lots of wood around for fuel, but I feed the boiler from the hot water tank in order to get steam quicker."

"Where do you keep your horses?" I asked.

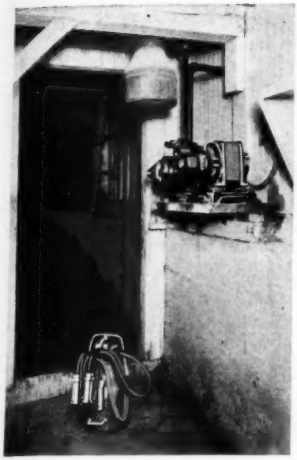
"We don't use any," was the reply. "We fill our silo and do all our field work with a tractor."

After asking some other questions I was ready to go, having a long drive ahead of me, but, like the ancient mariner, he stopped me again. "You haven't seen it all yet," he said, and started for the garage. The concrete driveway came by the house, under a covered portico, where the farmer could alight and pass on into the house without getting exposed to the weather. Mr. Moulton stepped over to one of the brick pillars that supported the portico.

"I stop my car right here," he said; and took a key from his pocket. Then I saw a lock set in the face of the brick post. He inserted the key and turned it. Could



For Medium and Large Herds the Electrical Milker Is a Real Time-Saver.



A Milking Machine Operated by a 1 H.P. Motor.

I believe my eyes—the garage doors were opening at the garage, about twenty-five feet further back! I mentally vowed that I would get my eyes tested when I got back to Spokane and in the meantime my son could do the driving. But another of my senses was functioning. I heard the doors rolling open. Perhaps I could drive part of the time, after all.

We entered the garage. Hung from the ceiling five or six feet from the center of the doorway was a little motor connected to a long, coarse pitched screw. A large nut on this screw connected two levers leading to each half door.

"Now you stay here," the owner directed, and he went back to the post and turned the key. The motor hummed and the doors closed, at which the motor stopped. Presently the motor started and the doors opened again, and Mr. Moulton came back into the garage.

"It's not quite perfected," remarked Mr. Moulton. "We need a control from inside the garage, also, so that we can get in and out while working about the car."

In a corner of the garage stood a deep well pump, having a capacity of 400 gallons an hour. It was operated by a 2 H.P. electric motor. At the work bench was a double grinder run by a ¾ H.P. motor.

"I have to go one hundred and fifty feet for water," said Mr. Moulton. "It takes quite a lot of electricity to furnish water for a dairy farm from that depth."

"What is your electric bill per month?" I asked.

"Around twenty-five dollars," was the answer, "after deducting my foreman's bill for lights, range, water heater," etc.

For such a cost, this up-to-date dairy farmer has electric lighting, cooking, milking—but why repeat the thirty-odd ways in which electricity has proved of economic value to this progressive farmer, lightening the burden on a forty-cow, 160-acre farm and its homes? The list is impressive enough to satisfy any dairyman that electricity is, indeed, his best and most faithful hired man.

Yes, electricity can do a great many things on the modern farm.

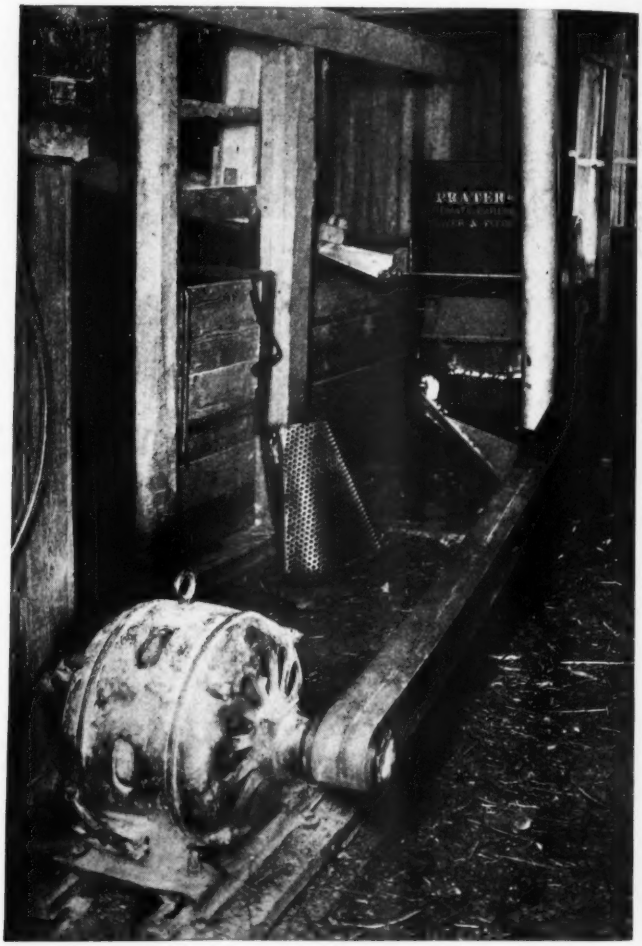
Wood Products Research Shows When to Repaint

Signs by which a house owner may judge when it is time to paint his house or barn have been determined from investigations by the forest products laboratory of the United States Forest Service at Madison, Wis.

If appearance is the main interest, it is time to paint when the paint on the house loses its gloss, when it becomes dirty, when the color begins to fade, or later when chalking or flaking begins, says the Forest Service. If the house owner's interest includes the practical consideration of protecting the wood, he should give close attention to the condition of the wood beneath the paint regardless of the general appearance of the coating. He can be guided by several signs of the need for paint.

Paint protects wood by retarding gain or loss of moisture, so that the sudden swelling and shrinking of the surface that causes weathering does not occur.

(*Continued on page* 21)



Feed Grinding Installation on the Farm of G. A. Brink Near Wichita, Kansas.

GRINDING OWN FEED PROVES PROFITABLE

Costs Less Than Having Work Done by Custom Mill

By A. R. LOYD

SOME very convincing data were obtained on a small electric feed grinding outfit using a 5 HP single phase motor driving a No. 5J Prater Mill. The motor and grinder were bought in the Fall of 1928 by G. A. Brink who lives seven miles north of Wichita, Kansas. In the Fall of 1929 he added the ear corn crusher. To date he has had no expense on either the motor or grinder.

A KWH meter was installed on the motor to record the exact amount of current used for grinding and Mr. Brink has given the amount of feed ground during the feeding season of 1929 and 1930. In this particular case approximately 50 head of young cattle were fed continuously and about 2,200 bu. of corn were ground.

Following are the results as obtained:

Total Cost of Current	$12.92
Ear Corn ground	700 bu.
Shelled Corn ground.	1,500 bu.
700 bu. ear corn= ...	49,000 lbs.
1500 bu. shelled corn=	84,000 lbs.
Total	133,000 lbs.
133,000 ÷ 100 = 1,330 hundreds. Total cost of grinding...	$12.92
16% of $140.00 interest and depreciation on cost of grinder = ...	22.40
8% of $175.00 interest and depreciation on cost of motor 50% of cost charged to grinding = ...	14.00
Total	$49.32

49.32÷1330=3.7 cents per hundred which was cost of grinding in this case. It would have cost at least 15 cents per hundred to have nad this feed ground at a custom mill.

To get entire saving in cost of grinding with this equipment one should include time and transportation cost required to take feed to the custom mill and back home in addition to the cost of grinding.

In this particular case:

1330 x 15c cost of custom grinding = ...	$199.50
It would have required at least 45 trips of 12 miles each or 540 miles @ 10c per mile for truck = ...	54.00
45 trips would require at least 4 hours each or 180 hours @ 25c per hour = ..	45.00
Total	$298.50

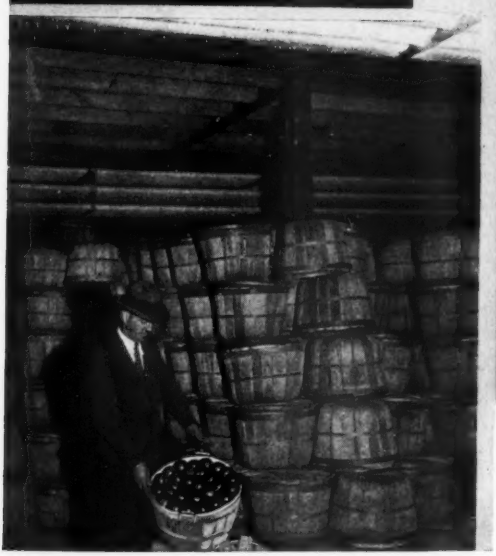
The entire cost of equipment to do this grinding was approximately $330.00 or only $32.00 more than the cost of one year's grinding. The owning of a motor driven feed grinder meant a net profit to this farmer of $298.50 — $49.32, or $249.18.

When to Paint

(*Continued from page* 19)

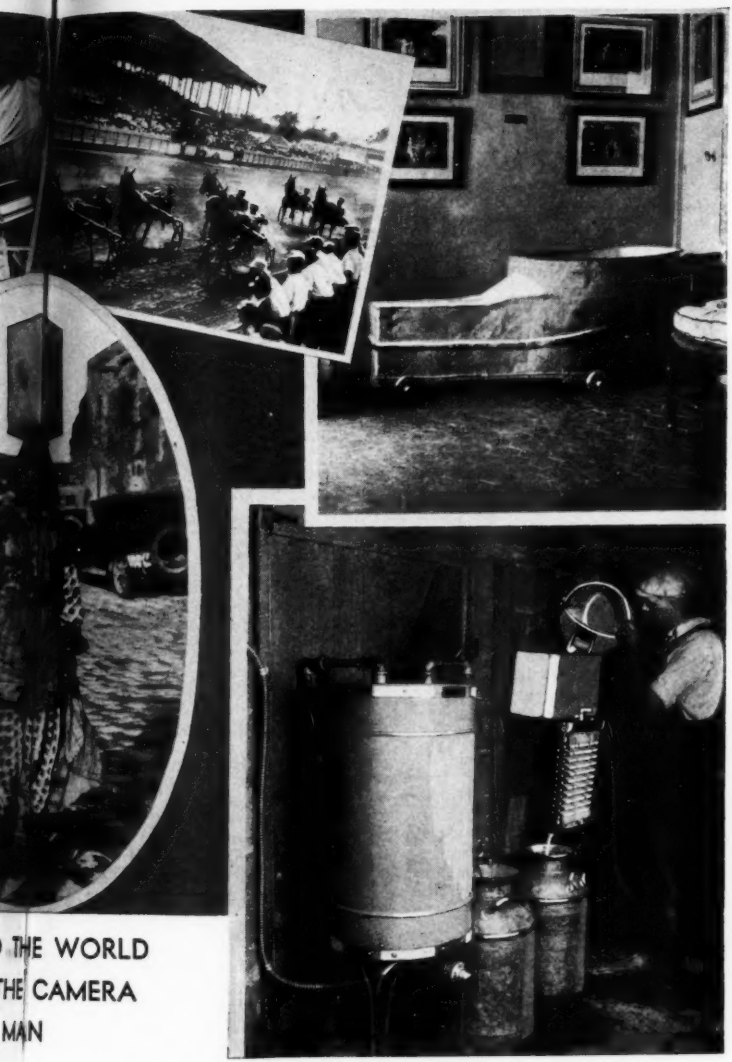
It may be effective in doing this even after some chalking has started. After fine checks or slits open up in the wood their development can not be halted without the application of paint or other moisture-resistant coating, and unless this is done there comes a stage when the checks are so large that the original smooth surface of the boards can not be brought back with any amount of paint.

The final phase of deterioration involves cupping of the boards and pulling away from nails. Paint will not remedy this condition and the building or house will not again look new and ship-shape unless new siding is put on.



AROUND THE W
WITH THE CAN
MAN

TOP LEFT: Raising lady bugs is quite a business in California. Each of the capsules shown c
them to combat the mealy bug. **TOP CENTER LEFT:** Electrically operated farm equipment ca
Fair last year. **TOP CENTER RIGHT:** Races will always prove the high spot of interest a
The ancient bathtub was of metal construction, and had rollers on it. Because of its mobili
in a Paris museum, and dates back to the 17th century. (Photo of Ewing Galloway.) **LOW**
room, at Unionville, Ohio. **CENTER:** The five-gallon oil can comes in handy in Palestine, whe
The electric wires carry both heat and cold. At the left may be seen an electric water h
electrically chilled water is passed through cooli



THE WORLD
THE CAMERA
MAN

les shown contains ten lady beetles. They are sent to gardeners and nurserymen who use quipment can be seen at most State Fairs. Here is a display staged at the Indiana State f interest at fairs. One of the races at the Indiana State Fair last year. **TOP RIGHT:** its mobility, it was designed to provide greater privacy. This is a metal bathtub shown ey.] **LOWER LEFT:** L. G. Dean, with McIntosh apples in electrically refrigerated storage estine, where it is used by water carriers to purvey and transport water. **LOWER RIGHT:** ic water heater, used for heating water for sterilization of dairy utensils. At the right, rough cooling coils of a surface milk cooler.

MORE COMFORT
AT LESS COST

By J. M. HERREN

"THE water pump on our farm gives more service than any other piece of equipment we have installed, and the cost of operation is very small in relation to the amount of time it is operated," states Mr. Clarendon Davis, R. F. D. 3, Huntsville, Alabama. Mr. Davis has the unique distinction of being the first user of a home electric plant in Alabama, and was one of the first farmers of the state to request and obtain service from a rural electric line.

Four years later, in August, 1926, test meters were installed on the range, water heater, water pump, electric refrigerator and lighting circuit. Readings have now been taken for 47 months and they furnish very interesting information as to the amount of electricity required for the different operations.

The Water Heater

The electric range, which has done practically all of the cooking for an average of five people and is operated by a negro cook under Mrs. Davis' close supervision, has used an average of 168 kilowatt-hours of electricity per month.

The electric water heater is used as an auxiliary means of supplying hot water for the family in winter and is used in the summer to supply the entire needs of the family. The heater is the side arm type, connected to a 30 gallon well insulated tank and is operated by hand control. It has used an average of 19 kilowatt hours per month to meet these requirements.

The water pump has used an average of 17 kilowatt-hours per month to supply the water to the home and for the farm livestock, in addition to watering the garden, flowers and yards in dry weather.

The electric refrigerator, which consists of a nine cubic foot box and air-cooled compressor with ½ h.p. motor, has used an average of 54 kilowatt hours per month.

The electric lighting circuit, which includes lights for the home, barn and yards—in addition to electric iron, vacuum cleaner, toaster and percolator—has used an average of 44 kilowatt-hours per month.

For all of the above operations, there were used during the 47 months a total of 14,167 kilowatt-hours or an average of 301 kilowatt-hours per month.

Present System Cheaper

Prior to obtaining electric service from the Alabama Power Company, Mr. and Mrs. Davis were using a farm lighting plant to light their home, a gasoline engine to pump water, both an oil stove and a wood or coal range for cooking, and were hauling ice from Huntsville for household refrigeration. Mr. Davis estimates from his own experience and cost records that electric service for his present uses is $26.13 cheaper per month than his former cost for the same operations, not including any value for the increased conveniences nor for the labor saved in the home. This saving amounts to $313.56 per year, which is a very considerable item—especially when life has been made more pleasant for the entire family.

Efficient Arrangement

All of the equipment on this farm is arranged so that it requires a minimum amount of space and at the same time affords maximum convenience to the user. The deep well force pump is driven from

Dairyman buys

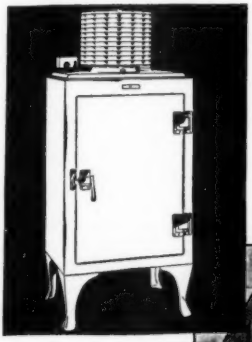
85

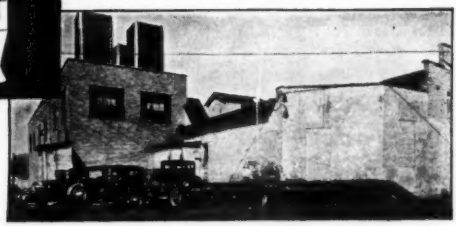
General Electric Refrigerators

for

ECONOMY
DEPENDABILITY
EFFICIENCY

•





JOHN IFERD, owner of the Golden Star Dairy, purchased 85 General Electric Refrigerators to preserve milk and other dairy products in stores supplied by his company. • Mr. Iferd's choice of General Electric Refrigerators was made only after a study of other leading types and makes. The simple Monitor Top mechanism of General Electric Refrigerators and Milk Coolers uses but a small amount of current—needs no attention—not even oiling, an important feature in rural districts. • The sturdy all-steel cabinet, the sliding shelves—the full-vision, sanitary porcelain super-freezer and acid-resisting porcelain-lined interiors all add to the dependability, convenience and economy of the General Electric. Every General Electric is guaranteed for 3 years against service expense. Call your dealer or write us about the low prices and easy terms.

General Electric Company, Electric Refrigeration Department, Section CZ9, Hanna Building, 1400 Euclid Avenue, Cleveland, Ohio.

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GENERAL ELECTRIC

ALL-STEEL REFRIGERATOR

Domestic, Apartment House and Commercial Refrigerators, Electric Water Coolers and Milk Coolers

shafting located at the ceiling. The pulley for this installation was built in the farm work shop. The 1 h.p. motor is also located at the ceiling, which gives more space on the floor for other uses. It performs others duties besides pumping water, the most frequently being the running emery wheel.

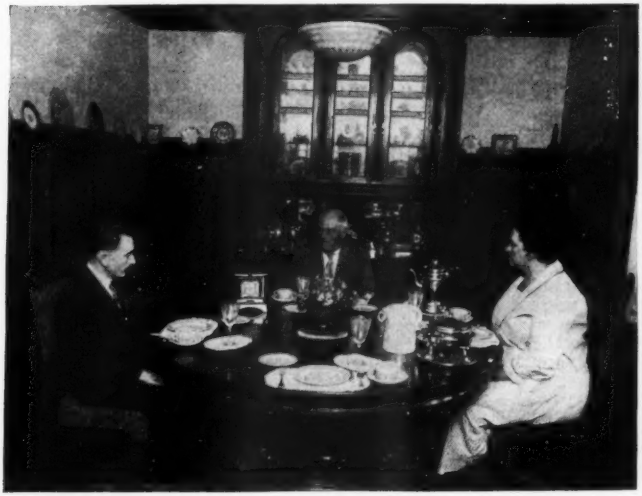
A Novel Layout

Mr. Davis has a very practical arrangement of pipe lines to take considerable load off of the motor when it is pumping water to the stock. He has the pressure storage tank located in the cellar of his home, and a large concrete trough in the lot for watering the stock. The pipe lines divide just after leaving the pump and there is a cut-off valve in each of these pipes. When pumping water for the stock, the valve on the line to the pressure tank in the cellar is closed. Then the only work that the pump has to do is to raise the water to the top of the ground, while if this water had to go through the pressure tank, the motor would not only have to do the work of lifting it to the top of the ground but would have to pump it into the tank against its pressure.*

During the dry season of the year, which is usually the late summer and early fall, the water pump has proven an invaluable aid not only to garden crops and flowers, but to shade and fruit trees around the house as well. The pump operates ten to twelve hours on some days in this season of the year.

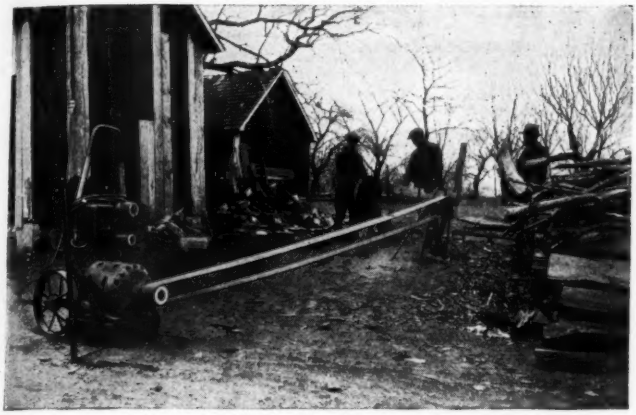
The farm has 17 horses and mules, 4 milk cows—besides chickens, hogs and other live stock. The average yearly consumption of electricity for this water pump over a four-year period amounts to 208 kilowatt-hours.

*(Editor's Note: A check valve in the line to the pressure tank and a cut off valve out at the stock tank or wherever one would naturally be to fill it would require still less attention and save many steps.)



Mr. and Mrs. Clarendon Davis in the dining room of their farm home near Huntsville, Alabama, discussing the advantages of electricity to the farm with Mr. J. C. Tyson, representative of the power company.

"THEY KEEP A-RUNNING"



5 Horse Power Century Portable Power Unit Used for Driving a Wood Saw on the H. E. Thompson Farm

This illustration shows one of the many uses of a Century Portable Power Unit on a farm . . . After finishing a wood-cutting job, it can be easily wheeled into position to furnish power for almost any other job where electric motor drive can be used . . . The crank-operated belt-adjusting screw provides for correct belt tension. The anchor bar, operated by the screw adjusts the belt tension and is the only anchor required to hold the unit properly in line . . . It has all the advantages of a permanent installation.

Furnished for either Single or 3 Phase Power . . . 3, 5 and 7½ horse power motors are the popular sizes.

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Century
MOTORS

FOR MORE THAN 27 YEARS AT ST. LOUIS

ELECTRICAL HOUSEKEEPING

Conducted by
GAIL MEREDITH

Breakfasts for Brides

ALL the June brides are studying cook books this fall. I dropped in on a favorite niece of mine the other day when she and some friends were finishing up a rubber of bridge. They were talking importantly about the difficulty they have in getting John to eat plenty of green vegetables and how Tom dotes on pie.

Getting breakfast on the table.

Two for him and two for me.

It would seem that they almost shudder to think of all the years those great big strapping males ate their way through heedless meals indifferent to calories or vitamins. They forget entirely that the mothers who got twenty or twenty-five years of meals for those same men had an eye on their welfare all the time.

Clara got up to bring out a tray of iced tea and a plate of crisp, fresh cookies. There was a little pause while we settled ourselves more comfortably and began to nibble at the cookies.

"What did you folks have for breakfast?" asked Alice Brown, the newest bride, quite suddenly.

"Breakfast?" said Clara, weakly, setting down the empty tray.

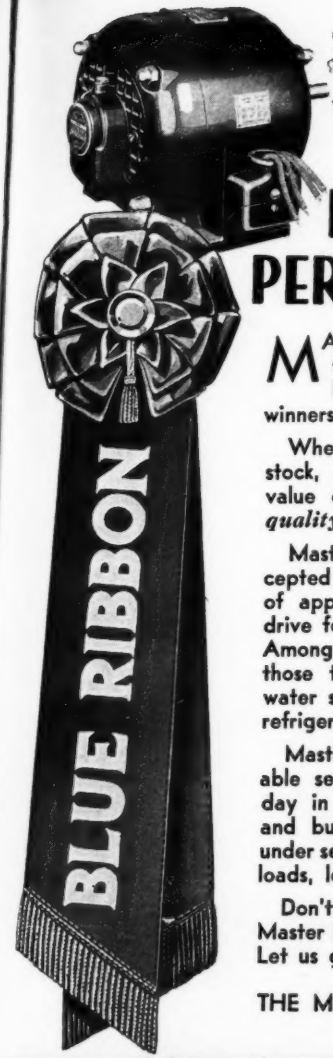
"Yes, breakfast," insisted Alice. "I have an awful time with breakfasts. I can't think of what to get, and when I do get things ready, John doesn't get through milking, or he has to go back and see where the turkeys are, and everything gets dried up. If there's anything worse than a fried egg shriveling up in cold bacon fat, I'd like to see it."

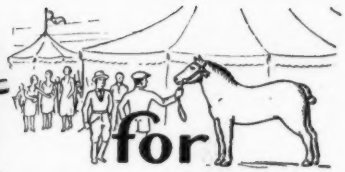
"Fried eggs!" snorted Serena, the one who had been a nurse. "How about that electric egg cooker you got for a wedding present. Doesn't John like boiled eggs?"

"I've never used it," admitted Alice.

"Why not?" a couple of us spoke at once.

"Why, I don't know. No reason in particular. I just haven't. But I can't think of anything but eggs for breakfast. I never ate breakfast at home. John seems to get





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Whether it be thoroughbred live stock, horses or motors, that added value comes from a *recognition of quality.*

Master Motors have long been accepted by many leading manufacturers of appliances as the standard motor drive for application to their products. Among these many appliances are those that serve you on the farm—water systems, dairy machines, electric refrigerators and others.

Master Motor quality means dependable service when you want it, every day in the year. They are designed and built to give that service—even under severe conditions—moisture, overloads, low voltage, rough handling.

Don't forget that handy helper, the Master Portable Farm Motor on wheels. Let us give you more information.

THE MASTER ELECTRIC COMPANY
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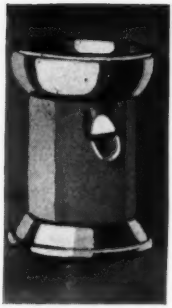
MASTER GUARANTEED MOTORS



Tom squeezes the oranges for breakfast.

tired of fried eggs," she admitted rather dolefully.

"So does Tom," put in Edith Horton. "He told me the other day that I might just as well sleep an hour longer, that he'd just as soon get his own breakfast."

Serena whistled.

"I'd say you girls need a short course in breakfasts. Why, I think they are the nicest meal of the day."

"You have to get up so early to get a regular meal," fretted Edith.

"And you can never count on when it will be eaten," put in Alice.

"And you can't think of things to get anyhow," finished up Clara. "Breakfasts are the bunk."

Serena picked up her purse and took out a loose leaf notebook.

"What's that?" asked Alice.

Serena laid the book open on the table before her.

"That, my dear sisters in marriage, is what we had for breakfast last week."

She flipped over a page and pointed dramatically. "And this is what we are having for breakfast this week."

Three eager hands snatched at the book.

"Let me see."

"Let's see."

"Serena, you old meany, let's see that book."

And Serena laughingly yielded it to their imploring fingers.

These are the menus they found.

Sunday
Orange Juice
Waffles with creamed chipped beef
Honey Coffee

Monday
Steamed dried figs
Soft Cooked eggs Graham Toast
Coffee

Tuesday
Prunes
Cereal
Baking Powder Biscuits Jam
Coffee

Wednesday
Baked Apples with Cream
Waffles with Maple Syrup
Sausage
Coffee

Thursday
Bananas with Orange Juice

Creamed Codfish Toast
Coffee

Friday
Green Applesauce
Soft Cooked Eggs Date muffins
Coffee

Saturday
Grapefruit
Cereal
Raisin Bread Toast Coffee

"Serena Howard! No wonder Chester goes around all the time looking like the cat that ate the canary. You're spoiling him. That's what. Why, those are regular company breakfasts."

"There isn't any company I like better than Chester," retorted Serena, "and there isn't so much work to breakfast. Take this Sunday one, for instance. I squeezed the oranges and put the juice in the refrigerator."

"That is one thing we always have," interrupted Edith. "Tom's cousin gave us a motor driven juice extractor, and Tom loves it."

Serena went on.

"I take out my jar of white sauce and warm it up slowly with the chipped beef. Then I put the coffee in the percolator and plug it in right near the table so it can bubble away there at my elbow while I am baking waffles. Putting the waffles together is all that's left, and that isn't too much work for a husky girl like me."

"But waffles get so leathery," put in Alice.

"My dear girl," Serena looked at her with scornful pity. "Can't you get it through your head? The whole secret of a successful breakfast is having it hot and ready when the eaters are ready to eat.

"I start the coffee and I pour in the first waffle after we sit down to the table. Not one second before. There may be a minute or two after we finish the orange juice before the waffle is done, but we're so busy talking that nobody minds. The chipped beef is standing on the table in a covered dish that keeps it hot.

"Could anything be simpler? The days we have toast, I make the

FREE BOOK
tells how to have
RU NG WATER
for a few cents a day!

New Low Prices!

Write for this interesting FREE BOOK that explains just what you want to know about running water. What type of plant will be best for you? How easily can it be installed? How little does running water cost? These and many other questions covered fully. Many illustrations. 18 pages of diagrams. This valuable book is *free!* Write for it. Fairbanks, Morse & Co., Dept. 9581, 900 S. Wabash Avenue, Chicago.

FAIRBANKS-MORSE
Home Light and Water Systems

Was $75 . . NOW ONLY
$66
(*Cash f. o. b. factory*)

One manufacturer is developing an electric double boiler like the electric teakettle.

toast as we eat it, and say can that man of mine go through a pile of raisin bread toast? He likes it just a certain shade of brown. It mustn't be too hard or too soft. He monkeyed with the setting of an automatic toaster until he got it just right. Now I always set it just that way. I'm not so fussy about the complexion of my toast, but I sure do like him pleased."

"Monday you had eggs, I see," said Alice. "Do you use your egg cooker?"

"I surely do," answered Serena. "I cook them right at the table, too."

"You can't do that with muffins or biscuits," objected Clara, pointing to Tuesday's menu.

"No," admitted Serena. "But I do mix them up the day before, all but the liquid. The muffins do take about half an hour to bake, but I start the biscuits in a cold oven. I bake them right on the bottom of the oven and they are done in twelve minutes. I always keep an eye on how things are going outside on hot bread mornings because they can't be baked after we sit down to the table. We like them a lot though, so I have them for variety."

By this time all of the girls were scribbling on the back of their talley cards. I imagine that getting breakfast on the table is going to have new meaning for some of the little brides around here, and some of the wedding presents are going to be drafted into the daily use for which they were intended, playing their part in easier pleasanter living.

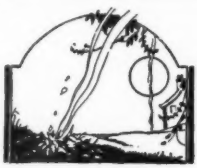
* * *

Selecting a Vacuum Cleaner

AT ONE of the midwestern colleges there is a regular course in the selection and care of household equipment. The girls in the classes of that course study all of the machines that college can coax into its laboratories. They look for their good points; they ruthlessly uncover the bad ones. They do jobs by hand and compare the time and strength they expend with the effort it requires to do the job by machinery.

As Miss Eloise Davison who used to head this work says, "They may not know what is the best machine in the world. The machine that is best for one wouldn't be best for her neighbor at all. But they do know the characteristics of a good machine. They know what it ought to do—and they know how to select the one that will do their particular job best."

To help the girls study vacuum



Autumn Fires

IN the other gardens
And all up the vale,
From the autumn bonfires
See the smoke trail!

Pleasant summer over
And all the summer
flowers;
The red fire blazes,
The gray smoke towers.

Sing a song of seasons!
Something bright in all!
Flowers in the summer,
Fires in the fall!

—ROBERT LEWIS STEVENSON.

cleaners the following score card was set up:

1. Will it save time and labor in my house?
2. Does it take out the dirt embedded in the rugs?
3. Does it pick up ravelings, hair, and bits of paper in a reasonably short time?
4. Does it brighten the color of the rug and make the nap stand up again?
5. Does it clean without great effort on the part of the operator?
6. Is it easy to guide and control?
7. Is it light enough for a woman to carry up stairs?
8. Will it be delivered ready to use or will I have to assemble it?
9. Does it require much care?
10. Is the noise loud or disagreeable?
11. Will it wear the rugs more than necessary?
12. Will it require many repairs?

Then, they add, before you finally decide on your machine, it is a good plan to consider the local dealer, too. If he is a member of a reputable concern, or if he runs a well established business with a reputation for fair dealing, you can buy with an easy mind. He will stand back of that cleaner; he will always have the parts that may be needed to repair it quickly and reasonably; and he will see that you are satisfied with your purchase.

* * *

How Electricity Helps Us.

Dear Gail Meredith:

I would like to write to my friends who read ELECTRICITY in the farm home. I have had electricity in my home since July 26th, 1930. First we got a range which I like so much I can scarcely tell you. It does the work for me right to a clock tick. With this range I found out that I can cut my electric bill down, by baking my cakes, pies,

ESCO

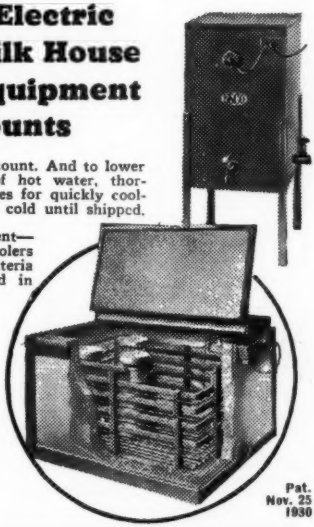
Electric Milk House Equipment for Low Bacteria Counts

To raise profits you must lower bacteria count. And to lower bacteria counts, you must have plenty of hot water, thoroughly sterilized cans and pails and facilities for quickly cooling your milk to below 50° and keeping it cold until shipped.

Esco Electric Milk House Equipment—Water Heaters, Sterilizers and Milk Coolers enable you to market milk very low in bacteria count . . . . that will be profitable and in demand.

Thoroughly engineered. Built in the very best manner and from the best materials for the purpose. Esco sets the standard of quality.

Ask your Power Company, Electric Refrigeration Dealer or write direct to us.



Pat. Nov. 25 1930

ESCO CABINET CO.

West Chester, Pa.

The Standard of the Better Dairies

Mrs. Edward Barton and the two babies on the porch of their home.

cookies or whatever it may be and when my baking is done, and the oven still hot, I put the heat up to five hundred degrees, place in the oven a three pound beef or pork roast about two inches thick. Around it I put one pound each of potatoes and carrots cut in pieces, leave the heat up to five hundred for twenty five minutes, then turn it out. In one hour and thirty minutes longer the meal in the open roast pan is done.

I have a large sink with three faucets for hot and cold soft water, and nice cold water from the well right at hand. I surely couldn't part with this convenience now.

A Bathroom, Too

Next comes my bathroom. I hear so many ladies telling how hard it is to keep the white pieces clean, I have found that by dampening a cloth either in kerosene or gasoline and going over these pieces with it, and polishing with a dry cloth it is easily and quickly done.

We have a water hydrant in the chicken coop and one in the cow barn.

I hope this will help the lady readers of ELECTRICITY ON THE FARM.

Yours truly,

MRS. EDWARD BARTON,

S. Rockwood, Mich.

Cooling the Hens

By D. B. Leonard

PROFESSOR JOHN S. CARVER, head of the Department of Poultry Husbandry, at the State College of Washington, is a good poultryman. He once broke the world's record in egg production with the White Leghorn hen, Lady Excelsior, and has since consistently maintained a flock average far above the State average.

Professor Carver has no poultry secrets, for his methods are given state-wide publicity by the College, but he does have a number of rules which help him get eggs when other poultrymen fail. One of his rules is to keep his hens as comfortable as possible at all times. He guards against cold in winter with double walls, straw lofts and celoglass curtains.

But when the temperature soared to 95 one sultry day in July, another condition arose that was perhaps as serious as extreme cold in the winter time. The Rhode Island Reds and White Rocks were especially warm and were panting for air when Professor Carver observed them. He immediately removed the air circulating fans from his mammoth incubator and mounted them in panels to be placed in the open windows under the dropping board at the rear of the house.

"The fans cost very little to operate," said Professor Carver, "and do a good job of circulating the air. After they had been in operation a short time the hens ceased panting and did not seem to be suffering from the heat."

Needless to say, they remained in use and their effect will undoubtedly be reflected in the egg production record for the year.

A Very Important One

"Tommy, can you tell me one of the uses of cowhide?"

"'Er, yes sir. It keeps the cows together."

Native: "Well, what do you think of our little city?"

Tourist: "I tell you, brother, this is the first cemetery I ever saw with lights."

Yours— For the Asking

Manufacturers will gladly send you descriptive literature from which you may obtain much useful and valuable information.

Check over the list below and write directly for any that interest you.

Dont' forget to mention ELECTRICITY ON THE FARM when writing.

For complete information on tool grinders, exhaust and ventilating fans and fractional horse power general purpose motor, both A. C. and D. C., ask for bulletins K-44, K-45, K-46, K-48 and K-49 which can be obtained by writing Marathon Electric Mfg. Company, Wausau, Wis.

●

Many of the electrical appliances for the farm are described in a small catalog entitled "Electric Helpers for the Farm" (GEC-89-B) available upon request from the General Electric Company, Schenectady, N Y.

●

Owners of homes and camps beyond sewer lines can obtain detailed information on complete "Certified" Sewage Disposal Systems by writing San-Equip Inc., Syracuse, N. Y.

●

"Dayton Water Systems Condensed Catalog No. 31-A" is the title of a sixteen page booklet which can be obtained from The Dayton Pump & Mfg. Company, Dayton, Ohio, which describes and illustrates in a brief manner the complete line of Dayton Pumps and Water Systems.

●

Folder showing the Stewart remarkable new electric clipper complete with motor and selling for less than $20.00, described in a circular "A Sensation," may be had upon request from Chicago Flexible Shaft Co., Chicago, Ill.

●

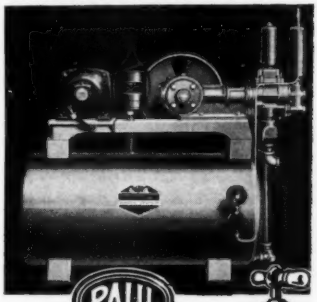
New, efficient electrical hot water heaters, 3 to 30 gallons capacity, of two types (manual and automatic), especially designed for farm and dairy use, are described in Circular 404 which can be obtained by writing the Esco Cabinet Co., West Chester, Pa.

●

How can I lower feed costs is the question which will be answered by writing for booklet to Prater Pulverizer Co., Chicago, Ill.

(*Continued on page* 41)

THE SILVER PRINCE



Running Water at Low Cost » »

AN *unfailing, abundant water supply,* instantly available for the kitchen, laundry or bath! A plentiful supply of water *with adequate hose pressure* for sprinkling the lawn or garden, fire fighting or washing the car!

This new Paul Silver Prince Water System is a real outfit, *pumping 300 to 400 gallons per hour* and yet the price is amazingly low. You can have the same modern conveniences as your city neighbor—and enjoy them while you pay for the Paul on twelve easy monthly payments. *Write today!*

Fort Wayne Engineering & Mfg. Co.
Fort Wayne, Ind.

Fort Wayne Engineering & Mfg. Co.,
1722 N. Harrison St.,
Fort Wayne, Indiana.

Send complete information and prices on the Paul Silver Prince Water System and easy payment plan.

Name.....
Address.....
City..... *State*.....

Questions and Answers

Conducted by
H. J. GALLAGHER
Agricultural Engineering Dept.
Michigan State College

Note—Readers are invited to send in questions which will be answered in the order received.

Question No. 1: *I am a salesman and come in contact with many people each day. Many of my customers have asked the questions:*

1. *How much current will it take for electric radio per hour?*
2. *How much current will it take for electric flat iron per hour?*
3. *How much current will it take for electric toaster per hour?*
4. *How much current will it take for electric washing machine per hour?*
5. *How much current will it take for a one burner electric stove per hour?*

I am not posted on charges and would like to obtain information as every person ought to know the exact cost. Shall look forward for an early reply and thanking you in advance for same. Yours truly, Earl Dunlap, Route 2, Brandon, Wis.

Answer:

Electric Energy Consumed

	Av. No. Watts Per Hr.	No. Hrs. Operation Per 1,000 Watts
Radio	50	20
Flat iron	600	1⅔
Toaster	600	1⅔
Washing Machine ...	250	4
Burner Stove.	500	2
	1000	1
	2000	½

The name plate on electrical equipment and appliances usually gives the number of watts used per hour. A kilowatt is 1000 watts. A kilowatt hour is the measure of work done as recorded on the meter. Energy used at the rate of one watt per hour for 1000 hours or at the rate of 1000 watts per hour, for one hour, is a kilowatt hour. The name plate on a washing machine marked 250 watts means that the machine would operate four hours to consume 1000 watts which would be indicated on the meter as one kilowatt hour, generally expressed as 1 K. W. H. If the rate for electricity is ten cents per K. W. H. the cost of operating the washing machine will be 2½ cents per hour.

Question No. 2: *I have purchased a General Electric 5 H. P. portable electric motor with which I intend to run a feed grinder in my barn which is approximately 400 feet from the house. I have an electric range in my house and I have the following conditions: From the transformer to house the 220 volt is No. 4 wire, the 110 volt, No. 6 wire. They run 90 feet into the house through the meter and into a 60 ampere switch and then into a large fuse box. Here I have three 50 ampere fuses for stove, then a No. 6 takes up and runs the range. My intentions were to put in another set of fuses in fuse box and run a No. 6 wire to my motor.*

Now for my questions: Is the No. 4 wire to fuse box large enough? Is the 60 ampere switch large enough? Is the No. 6 wire from fuse box to motor heavy enough? I am enclosing a diagram of the above conditions which probably will be easier for you to understand. Yours truly, Wm. Dale, Lexington, Kentucky.

Answer: With the transformer 90 feet from the 60 ampere entrance service switch two No. 4 and No. 6 wires have ample carrying capacity for the size of the switch. The No. 4 wires each

carry 110 volts of electricity, these two wires connected to a motor give 220 volt service. The No. 6 wire is merely a non-current carrying ground wire that is used with either of the No. 4 wires to form a 110 volt circuit.

A 60 ampere service switch is large enough for 5 H.P. motor and electric range operation except on such occasions when both the range and motor are operated to capacity at the same time. This condition seldom occurs and would not generally warrant the installation of a larger entrance service switch to replace a 60 ampere switch already installed. A 100 ampere service switch insures a reserve of power that permits the operation of other equipment and appliances while the range and 5 H.P. motor are operating.

No 6 wire to the range is the standard size used and is of ample capacity.

Two No. 4 wires should be used to carry 220 volt service 400 feet from distribution to 5 H.P. motor. One No. 6 wire could form the third wire for 110 volt service.

Question No. 3: *I have a one horsepower motor that does not pick up speed when starting. It is a 110-220 volt motor and has four wires. How should this motor be connected to run on a 110 volt current? As it is, it will not start under load of a 4 to 1 geared pump jack with a 20 inch pulley and a 1½ inch on motor.*

How large must the wire be to supply current? I am using a No. 14 wire. The motor uses 12.8 amperes. H. Hettling, Loraine, Wis.

Answer: The August issue of Electricity on the Farm answers the question of how a motor is connected to a 110 volt or 220 volt circuit. No. 14 wires will conduct 15 amperes of current 45 feet on 110 volt service and 90 feet on 220 volt service.

Compare your installation with following data:

Amperes	Wire B & S Gauge Rubber Covered	Distance, Ft. Volts 110	220
15	No. 14	45	90
15	No. 12	75	150
15	No. 10	105	210
15	No. 8	190	380
15	No. 6	290	580

JUST THE RIGHT CAPACITY—500 Gallons per Hour

A NEW SHALLOW WELL SYSTEM

Consider carefully the capacity you will need when selecting an electrically operated water system for your home. Make sure it amply provides running water to take care of your needs in the house, barn and other outbuildings. There are DAYTON Shallow and Deep Well Systems in every needed capacity, including the newest 500 Model, which has been especially designed to supply 500 gallons per hour. Just the right capacity for the average farm home needs. This new model comes with choice of 12 gallon, 30 gallon or larger pressure tanks and installs at a remarkably low price. Write for a full description of this and the many other DAYTON Models.

Dayton WATER Systems

The Dayton Pump & Mfg. Co., Dayton, Ohio.

Gentlemen:

Please send complete information, prices and illustrations of DAYTON Water Systems.

Name .....

Address .....

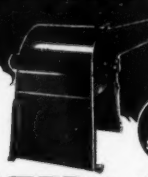
.....

E.F.9

MAKE THE *WATER* DO THE RUNNING

HOW
can I lower
FEED COSTS?

2 H.P. SIZE $48.75



5 H.P. SIZE $75.00

The
PRATER MILL

will solve this very important question for you by grinding all the feed you need in a few hours each week. PLEASE WRITE US now—telling us how much feed you use—let us tell you in return how much it should cost you—it will save you dollars every month—WRITE NOW.

There are more electric motor-driven Prater Mills in operation than all other makes combined.

Prater Pulverizer Co.,
1829 So. 55th Ave.,
Dept. K., Chicago, Ill.

Cullman *Electric* PUMP DRIVE

DOES NOT PREVENT HAND OPERATION

Even in an emergency you are always sure of water, for the Cullman Drive quickly permits hand or windmill operation.

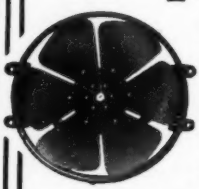
Easy to install—just clamp it to your pump and connect the wires.

Enclosed—safe—economical to operate.

May we send a folder?

CULLMAN WHEEL CO.
1342 Altgeld St., Chicago, Ill.

VENTILATE with
MARATHON
"OK" FANS



You could not do good work if you had to breathe bad air. Neither can cows or chickens. This powerful Marathon

Dust Proof Motor

means longer life; drives specially designed 6 blade 'prop' that moves more air. Note these low prices and write for all details!

16"—1725-850 RPM
or 1140-550 RPM $57.50
18"—1725-850 RPM
or 1140-550 RPM $67.50
20"—1140-550 RPM $77.50

Marathon Electric Mfg. Co.
Wausau, Wisconsin

RULES

September Front Cover Title Contest

For the best title to this month's front cover illustration, a cash prize of $25.00 will be awarded.

In addition, we will pay $5.00 for each of five titles given honorable mention.

In case of a tie, each winning contestant will receive the full cash prize to which he or she is entitled.

The winners will be announced in the November issue.

Only the farmers or members of the farm family, to whom this magazine was sent, are eligible.

Only one title may be submitted.

Use the form on page 39, opposite, or write your answers on a plain sheet of paper in similar form.

Contestants must answer question (a) on opposite page.

Write plainly and send your suggestions to the Title Editor, ELECTRICITY ON THE FARM, 24 W. 40th St., New York, before October 5.

COVER TITLE CONTEST

Every month more of our readers are participating in this contest, for which six cash prizes are awarded. Send in your entry today—every member of the family is eligible. The winners for July are given below and the rules for this month's contest on the opposite page.

JULY CONTEST

FIRST PRIZE— $25.00

"Once Grandma did the churning with the knitting on the shelf; Now Grandma does the knitting while the churning does itself."

Ralph Blosser,
Goshen, Ind.

The following titles have been selected as winners of the

$5.00 Cash Prizes

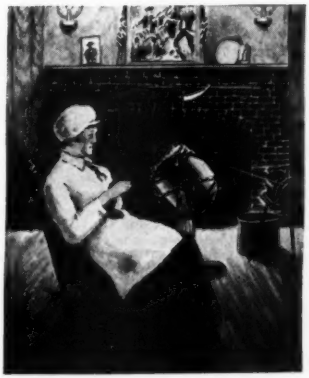
"To an electric motor she owes her release, She used to churn with elbow grease." Mrs. Samuel Klotzbach, R. 1, Basom, N. Y.

"Electric power has paved the way, To Mother's Independence Day." Mrs. H. G. Butler, R. 2, Waterport, N. Y.

"Grandmother's Independence Day, Butter churned the electric way." Mrs. T. G. Lambert, R. 3, Molalla, Ore.

"The churn that turns by electric power, Saves Grandma many an extra hour." Mrs. Wm. Marlett, R. 1, Hannibal, N. Y.

"Dear and old-fashioned in all else but churning, Electricity does all the old job of turning." Mrs. P. J. Christiansen, Bennington, Neb.



July Front Cover

My title for the September Front Cover picture of ELECTRICITY ON THE FARM is

.....

.....

.....

.....

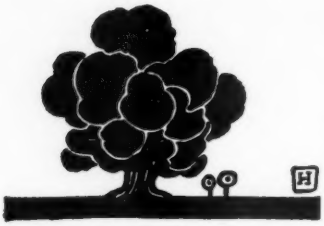
.....

(a) Mark X after any of the following Electric Appliances you now own:

Electric Water System.....	Electric Milking Machine.....
Electric Refrigerator	Electric Cream Separator.....
Electric Vacuum Cleaner.....	Electric Brooder .....
Electric Range	Electric Incubator .....
Electric Clothes Washer.....	Electric Feed Grinder.....
Electric Radio	Chore Motor (5 to 7½ h.p.).....

Name..... R. F. D.....

Post Office..... County..... State.....



Under The CHESTNUT TREE

Believe It or Not

Once upon a time an enterprising poultryman crossed his hens with parrots, to save time. He used to spend much time hunting the eggs, but now the hens walk up to him and say, "Hank, I just laid an egg. Go get it."

"My goodness," exclaimed the stranger who had dropped into the police court, "they've caught a pretty tough lot this morning, haven't they?"

"You're looking at the wrong lot," said his neighbor. "Those aren't the prisoners. They're the lawyers!"

Blowed, Not Puffed

"My lands!" exclaimed Uncle Rufe Fallow, of Grapevine Creek, as he gazed at a saxophone display in a music store, "the things people smoke nowadays!"

"My father is mayor," bragged a small boy, "and when he rides in a parade the motor cops go ahead and he doesn't have to pay any attention to any traffic rules."

"That's nothing," sniffed his friend, "my father's a truck driver."

"Can you serve company?" asked the housewife when she was hiring the servant.

"Yes mum, both ways."

"What do you mean?" asked the puzzled one.

"So's they'll come again, or stay away."

What the Office Needed

Johnny, 10, on applying for a position as office boy was told by the smart manager: "No, I am afraid you are too small. I think the reason is because your legs are too short."

With a smile the young applicant looked up and replied. "Huh, what this place needs is brains, not legs."

He got the job.

Guest "Look here! How long do I have to wait for the half portion of duck I ordered?"

Waiter: "Till somebody orders the other half. We can't go out and kill half a duck."

Painless?

Willie: "Hey, Mama! That dentist I went to wasn't painless."

Mother: "Why, did he hurt you?"

Willie: "Now, but he yelled just like any other dentist when I bit his finger."

Does it Make You Uncomfortable?

Wanted—I am in a position to hatch your eggs at 5 cents per egg. Red Mills.—Adv. in a California newspaper.

The Modern Elephant

Muriel had been to the zoo for the first time and was giving her grandmother a long account of what she had seen.

"And which animal did you like best, dear?" asked her grandmother when Muriel had finished.

"Oh, the elephant+" was the reply. "It was wonderful to see him pick up peanuts with his vacuum-cleaner!"

"I advertised that the poor would be welcome at this church," said the minister, "and after inspecting the collection, I see that they have come."

Collect the Chickens

Commuter: "I found this dozen eggs on the train."

Station Agent: "If they're not claimed in 30 days, they're yours."

Radio Modesty

A group of traveling men were swapping lies about their radios. An old man had been listening silently.

"Got a radio, old man?" asked one of the drummers.

"Yeah," replied the old fellow. "I got a little two-tube affair. It's a pretty good one, though."

"Can you tune out these little stations with it?"

"Well, I was listening to a quartet the other night, an' I didn't like the tenor so I just tuned him out and listened to the three of 'em."

$75 will buy a genuine

DELCO Waterboy

($78.50 with galvanized tank. Prices f. o. b. factory)

● **Small down payment. Easy terms. Write today for free literature.**

DELCO APPLIANCE CORP., Dept. C-28, Rochester, N. Y.

1-16

Yours for the Asking

(Continued from page 35)

The Lauson Corporation, New Holstein, Wisconsin, have a complete booklet of instructions for installing electric pump jacks properly that is available for the asking.

●

"Cullman Electric Pump Drive" is the title of an interesting folder which can be obtained from the Cullman Wheel Co., Chicago, Ill.

●

"Wherever There is Life There is Need for Running Water" and why is described in the water service booklet obtainable from Fairbanks, Morse & Co., Chicago, Ill.

●

"Running Water in the Farm Home" is covered by Bulletin 40 for those who have deep wells and by Bulletin 110 for those who have shallow wells, both booklets gladly sent by The Kewanee Private Utilities Co., Kewanee, Ill.

●

The "Reel Blade," a paper of interest to poultry raisers and hatcherymen, can be secured by writing Ira M. Petersime & Son, Gettysburg, Ohio.

●

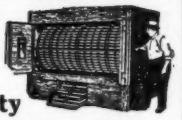
Battery brooding of chicks as well as canopy brooding with electric current is shown in the 16 page booklet on "Oaks Electric Poultry Equipment" which can be obtained by writing Oakes Mfg. Co., Inc., Tipton, Ind.

●

Specifications and description of portable motor grinder for farm use, Form 376-A, can be obtained by writing The Master Electric Company at Dayton, Ohio.

MAKE MONEY!

Start a Hatchery in Your Community



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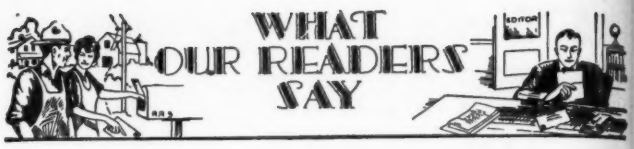


An Indispensable Servant

Every electrical servant performs its work faultlessly, there is no choice to be made by comparison. Which electrical servant is indispensable? For me it is the electric refrigerator. Constantly guarding the family health by keeping all food in perfect condition. Every food put in the electric refrigerator is more delicious when taken out. The electric refrigerator has no substitute with an instant cold control and odorless food chamber. It works for you every hour and every day in the year, asking no assistance, and pays for itself out of the savings from food spoilage.

MRS. J. H. AUGUSTINE,
Blackfoot, Idaho.

* * *

The Motor Again

The motor is a genuine electrical servant, because it can be applied to both sewing and washing machines, which makes it a source of great comfort in the home.

Washing can now be done with pleasure instead of being a tiresome, back-breaking job. The family sewing can be done more quickly, and since the motor was installed everyone is happier. It has also been applied to various pieces of equipment around the farm.

In my opinion, the motor is the greatest labor-saving device of the age, because it does away with a great deal of drudgery and hard work.

MRS. F. S. O'BRIEN,
R. 6, Box 152A, Salem, Ore.

* * *

Serves Home and Garden

The electric pump has brought real pleasure and comfort to me. For years I have been handicapped with a weak back. I could not draw or lift water. With the pump I can have hot or cold water any time. It is pumped into my kitchen, bathroom, bedroom, garden and flower yard. The pump is a means of me having fresh vegetables and flowers, even through a dry season. From a child I have loved beautiful flowers. With this convenience I may keep some growing all the time. People often wonder why I have fresh vegetables and flowers, while they can not. I tell them it is the wonderful pump.

LENA MAE HARRIS,
Athens, La.

* * *

Now and Forever

The electric washer is a worthwhile electrical servant because of labor, strength and time conserved.

The labor entailed in doing an average size washing is negligible. My strength is taxed little beyond that of a day of ordinary house work. My vitality and attractiveness (and what woman holds either in low esteem?) are undulled by fatiguing hours incurred through other methods of washing.

In this age of multitudinous interests, conservation of time is no mean affair.

If I were forced to choose between the helpful electrical devices, I should say unhesitatingly "An electric washer—now and forever."

MRS. LYLE R. PRUDEN,
Myers Rd., Geneva, Ohio.

CLASSIFIED ADVERTISING

The LYON ELECTRIC COMPANY manufacture electric poultry equipment exclusively. Long, practical experience in the highly developed California rural electric field enables us to furnish quality devices at reasonable prices. The LYON line includes: Brooders—Incubators — Egg Testers — Burglar, Temperature and Power-off Alarms — Heating Elements—Thermostatic Supplies—Time Switches—Wiring Supplies. Write for catalog today. LYON ELECTRIC COMPANY, 2075 Moore Street, San Diego, California.

The BURGLAR ALARM on the Farm. Night after night, fair weather or foul, MIDNIGHT ALARM will guard your poultry house and residence while you sleep. Be well protected, install the MIDNIGHT ALARM, NOW, before it's too late. Approved after test by Poultry Tribune Experimental Farm. MIDNIGHT ALARM SYSTEM, 2327 Chickasaw, Cincinnati, Ohio. Write for circular "F."

MERCHANDISING SUPPLEMENT
Electricity on the Farm

Vol. 4 SEPTEMBER, 1931 No. 9

FARM POWER

Probably at no other time in the history of American farming has it been so necessary to reduce overhead. The present prices for farm products leave little margin of profit.

The farmer who can keep his costs down is the one who is going to weather the depression and come out strongest in the end.

Those farmers who have electric service are in an admirable position to economize. Electricity can do so many chores on the farm, and otherwise aid in doing farm work, that in many instances it has been possible to reduce, or entirely eliminate, hired help. Reduction in hired help is a reduction in one of the largest cost items on almost any farm.

Capabilities of electric equipment in this respect should aid the salesmen to a considerable extent in selling electrically operated farm equipment at the present time.

Problems of Extending Electric Service to Farmers

By T. E. MILLER*

The Pennsylvania-Ohio Power & Light Co.,
Youngstown, Ohio

IN order to analyze the many problems surrounding the extension of electric service lines in rural communities and earnestly strive for their solution, it is essential that both the Electric Service Companies and the Farmers have a proper appreciation of the need for that service.

It should be clearly recognized that primarily, rural electrification means electricity AT WORK on the farm. A substantial current consumption per farm is necessary before either the farmer or the electric service company can realize potential possibilities. In this connection, line building and the adding of farm customers are only necessary steps leading toward the final goal—an electrified agriculture.

When electric service companies were first called upon to extend their lines into rural territory, both the farmers and the companies thought in terms of electric service for lighting purposes only and surprising as it may seem, there are a large number of folks who still think along the same lines.

Extension Methods Numerous

Where the service is used for lighting only, it naturally follows that this class of business is not only very unprofitable for the electric service company but results in the farmer paying a very high rate for the small amount of energy that he uses. Numerous methods for the extension of rural lines have been adopted by the various companies since the demand for the use of their service on the farm became apparent. In a majority of cases, the methods adopted have required the farmer to furnish a major portion of the money required to build the line. The reason for this being the few consumers per mile of line built and the SMALL USE of service by these consumers AFTER they were connected.

Many miles of rural lines have been, and are being built under some one of these methods, but as a whole. I believe that a majority of the methods used have proven equally distasteful to the farmers and the electric service companies.

From the farmers' viewpoint, when called upon to advance a considerable sum of money to finance a line, the total investment required to meet this cost and properly wire his buildings, becomes a real problem and he feels compelled in many instances to cut his wiring installation to a point where it is entirely inadequate for his original requirements, let alone providing sufficient capacity for future development in his use of the service. The farmer under these conditions, even though he is convinced of his need for the various electrical appliances and equipment, is going to be seriously handicapped in their purchase for some considerable time after he secures the service. This deprives him and his family of the real blessings of electric service in eliminating drudgery from the home and farm.

A Community Enterprise

The result of all this to the electric service company is self-evident. A rural extension is essentially a community enterprise and where it is necessary for the farmer to assist in financing, it requires close cooperation on the part of everyone in the community. We have found it to be very difficult for everyone involved to be

* Speech delivered at 17th Annual Farmers' Week, Ohio State University.

ready to proceed with an extension at the same time. This results in numerous delays which in turn creates general dissatisfaction.

After an extension is finally completed, due to the heavy first cost to which the farmer has been put, he is unable to avail himself of the proper use of the service with consequent low revenue to the company and high rate per unit for energy consumed to himself.

Pennsylvania Method

We have had considerable experience with the extension of rural lines under divers methods where the consumer has been required to assist in financing and we have naturally followed with a great deal of interest, the operation of the method now in use in our neighboring state of Pennsylvania, namely General Order No. 28.

General Order No. 28 was issued by the Public Service Commission of Pennsylvania effective April 1st, 1927. Prior to this order being issued by the Commission, representative groups of the various farm organizations and electric service companies got together and discussed their mutual problems and in a friendly way, arrived at an understanding. They presented the method agreed upon to the commission for their approval and with the request that an Order be issued, based upon this mutual understanding and superseding any previous Order. After proper hearing and modifications, General Order No. 28 was issued.

This General Order is simply a statement of a principle on which electric service will be extended in areas not yet being served, and the Order was issued to establish this basis. The Order lays down the basic principle that in all cases where the Consumer will guarantee to use and pay for a reasonable amount of energy, the Power companies will make extensions at their own expense. It defines the consumer as being an applicant for service from a line extension who has contracted with an electric company to take service and pay for same for a definite period of time. It defines line extension, point of origin, the electric company, the construction cost, the service, and other points upon which there may be a possible misunderstanding. It requires the electric company to make line extensions in the territory in which they operate providing the applicant shall after establishment of credit, contract for the payment of current supplied them at the electric company's filed tariffs. It requires the electric company to file with the Commission as part of its tariffs, a rule stating the conditions under which it will make line extensions to supply any consumers within its territory.

Two Per Cent Revenue

Under the requirements of the Order, practically all of the companies in the State of Pennsylvania filed tariffs in which a guarantee of revenue equal to two per cent (2%) of the net cost of the line was required.

It is easily apparent that the guarantee of revenue does not initially return a reasonable profit to the electric service company. However, it does permit the line to be

The ultimate success of rural electrification depends upon the development of the application of electric energy to farm operations so that the farmer will be able to use sufficient quantities of it to assure the companies a fair return on investment.

operated and maintained in a safe condition and the degree of profit which any individual line will return depends entirely upon the Commercial Department of the respective company in developing a use of the service in excess of the guarantee.

While there is no doubt as to the improvement of this method over the old methods which we have employed, yet no plan in itself will completely solve the rural extension problem. The real solution can only come through mutual understanding and close cooperation at all times between the electric service companies and the farmers.

The ultimate success of rural electrification depends upon the development of the application of electric energy to farm operations so that the farmer will be able to use sufficient quantities of it to assure the companies a fair return on investment. This quantity use will in turn enable the companies to provide attractive rates which assure real economy in farm operation.

The Company should construct lines of a type that will insure efficient service at all times and should put forth every effort to acquaint the farmer with the various farm operations which can be successfully carried on with the proper electrical equipment. It should assist him in every possible way in the proper application of this equipment. Rates should be available which will encourage a volume use of the service.

It is not to be expected that every farmer can start off with a completely electrified farm, nor is it to be expected that he can hope to electrify his farm unless it presents definite economic advantages. With proper rates available for volume use, there can be no doubt of these advantages. Therefore, the farmer should be receptive to the application of electricity to his many farm operations and the use of proper electrical equipment.

In closing, let me repeat that by meeting the various problems that arise in connection with rural extensions, with mutual understanding and close cooperation, we will, within a very few years, reach the goal for which we are all striving - - - an electrified agriculture.

Editor's Note: While the above paper was prepared and presented several months ago, it is believed that our readers will find much of current interest and value in it; hence its appearance here.

Automatic electric water systems are fast replacing the old hand pump, thus making available an abundant supply of water for the entire farm.

RURAL ELECTRIFICATION Salesmen's Forum

Conducted by TRUMAN E. HIENTON

Wiring the Poultry House

SELLING the farmer a service or commodity which will increase his income, as proven repeatedly by experiment and practice, should be an easy task and quickly done. The use of electric illumination to increase winter egg production is a striking example of an economical application of electric energy on the farm which has not been sold to the farmer to the extent that is warranted by the extra return it will provide him.

The load offered by this very practical use of electric current is one which has a decided appeal to power company representatives particularly beccause of the time of day at which it usually occurs. It offers also to the wiring contractor or equipment dealer who does electric wiring an opportunity to provide this farm customer with an installation which he knows will return a profit to him through its use.

An illustration of the failure of farmers to take advantage of the information furnished by agricultural experiment stations and from the practices of other farmers may be taken from figures contained in Bulletin 496 of the Cornell University Agricultural Experiment Station. The results of an economic study of farm electrification in New York, contained in this bulletin, show the number of buildings wired on 1786 farms in New York in 1927. Of this total group of farms only 552 or less than one-third had poultry houses wired, al-

Indiana farm poultry house in which electric lighting was used experimentally to determine its value. Eighty lighted pullets laid 484 more eggs during November, December, January and February than eighty similar unlighted pullets.

though the average number of hens per farm exceeded two hundred. This seems particularly worthy of consideration because of the active interest of that experiment station in artificial lighting of poultry.

Artificial illumination of poultry house during the fall and winter months was probably first practiced at an agricultural experiment station in 1906 by Prof. J. G. Halpin, who was then at Michigan, but is now at the University of Wisconsin. The use of artificial lighting of poultry has developed rapidly during the last 15 years and today is accepted as a standard practice by many poultrymen, particularly in the northern part of the United States. It is today being recommended for use in the southern states but has not been adopted as quickly as in the North because of the relatively longer days and less highly developed poultry industry.

Proper Feeding

A common objection to the use of artificial lighting of poultry is that it is not "natural" and may be detrimental to the health of the fowls. Many experiments have been conducted at various agricultural experiment stations in which results show that the problem arising from the use of lights is one of proper feeding for the birds. When natural feeding conditions are produced by proper methods this complaint disappears. The report of forcing hens at Oklahoma Agricultural Experiment Station (1930 report) indicates clearly the part feeding holds, when the birds are subjected to the use of artificial light, in the following paragraph:

"Moderate forcing of hens for winter production does not seem to injure the health of the hens, their body weight, size of eggs laid, fertility or hatchability of the eggs provided the ration is complete and adequate and includes a generous daily feed of greens."

The real motive in inducing pullets and hens to produce more fall and winter eggs through the use of artificial lighting is because of the relatively higher prices which prevail for fresh eggs at those seasons of the year. The advantage of a higher price for eggs means more profit over those produced when a lower price prevails if produced at the same cost. However, according to the University of Delaware agricultural experiment station bulletin No. 151, "Eggs can be produced more economically under artificial illumination during the winter months than under natural conditions."

The foregoing situation, if true under all farm conditions, means that with a lower cost of production and a higher selling price, that a much greater profit is made by the poultryman for eggs produced under artificial illumination. Based on the results of tests conducted at Oregon State College, an estimated profit from lighting 400-hen flocks was included in Station Bulletin No. 231 of that institution. The excess profit from October 1 to September 1 for that number of lighted quick maturing pullets over a similar number of unlighted pullets was $93.72, for slower maturing pullets, $85.02, and for yearling hens, $17.14.

While it is generally agreed that egg production is increased during the time of lighting, results are not in agreement on the effect on yearly production. Figures reported in Bulletin No. 56 of the Ohio State University of Agricultural Extension Service show an average yearly egg production per bird of 142.4 for 189 flocks using lights and one of 131.3 for 567 flocks without lights. This difference of over 8 per cent in favor of lights is in direct contrast to work conducted at Kentucky where lights did not increase the number of eggs laid during the entire year by the hens. It would seem inadvisable at the present time to make definite claims concerning the annual production of eggs being increased by the use of artificial lighting, unless more positive results are available as a basis for the recommendation.

Results in Delaware Tests

The results of three years' tests conducted at the Agricultural Experiment Station of the University of Delaware probably are typical of increased production which may be expected from White Leghorn pullets due to artificial lighting. The

increases over unlighted groups from November 1 to March 1 during three years of work where lights were used from October 15 to March 1 were 14.0, 12.2, and 12.1 eggs per bird respectively. In a trial in Indiana in 1926-27 under the direction of the author, a farm flock of 160 Buff Orpington pullets was divided into two equal groups. In one pen artificial lighting was used from November 1 to March 1 and during that time 484 more eggs were produced, an average of 6 eggs per bird, than by the unlighted hen.

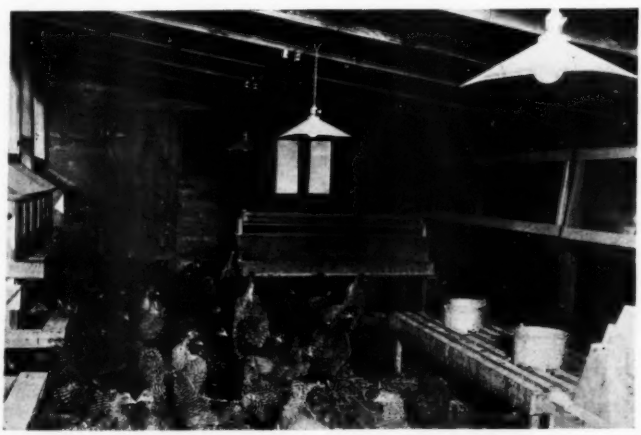
Lighted Pens Show Increase

In tests conducted with forcing hens at Oklahoma Agricultural Experiment Station (Reprint from 1930 report) one pen of hens, fed mash, grain and grain feed which received lighting from 4 a. m. to daylight, laid an average of 47.0 eggs per bird during November, December, January, and February. A similarly fed pen not receiving the lighting laid an average of only 26.2 eggs per bird or a difference of 20.8 eggs in favor of the lighted pen.

The methods of using lights may be placed into five classes, morning only, morning and evening, evening only, evening lunch, and all-night. The first named is undoubtedly used most extensively at the present time. Records obtained on Ohio flocks using the first four mentioned classes were presented at Ohio State University in November, 1930, before the Conference on Rural Electrification. Of the number included in the report, 310 flocks used morning only, 89 used morning and evening, 31 used evening only, and 36 used the evening lunch. Annual production per bird for the various methods was 154.0, 149.2, 145.7, and 145.0 eggs in the order previously named.

Morning lighting is used most frequently because it is simplest to handle. The lights are usually turned on by an alarm clock or inexpensive switch at any desired time and are turned off again shortly after daylight by hand. A common method of feeding is to place the grain in the litter at night after the birds have gone to roost.

The morning and evening has two chief advantages. The first one is that a uniform length of day may be used, eliminating any variation in length of day due to changing hours of sunrise and sunset. The



Poultry house near Bedford, Indiana, in which artificial illumination is used to stimulate winter egg production. The reflectors were made according to the specifications of Cornell University.

second advantage, is that it permits working in the poultry houses after sundown without disturbing the birds, which is especially important in poultry plant of good size. The chief disadvantage is the necessity for providing a dimming device to get the birds onto the roosts.

The evening light is similar to the morning light except that it lengthens the day at the end instead of at the beginning. It has no advantage over the morning light and does require the use of a dimming device. The evening lunch method consists of giving the birds one hour of light about 8 or 9 p. m. to break the dark period from sundown to sunrise. The records previously quoted indicate that as good results were accomplished by it as either of the two using evening light and the necessary dimming device.

All-Night Method

The all-night method of lighting is one which has received considerable attention during the last two years particularly at the Ohio Experiment Station. It consists merely of using a low-wattage lamp in the poultry house all night. From the standpoint of load building, it should be interesting to power companies but should have additional experimental work to establish its value as compared to other methods. It offers a desirable method for the use of the new ultra-violet lamps which fit the ordinary lamp socket and are being used experimentally to replace cod-liver oil in the laying mash, as well as for artificial illumination.

The recommendations of Cornell University contained in Bulletin No. 90 are generally accepted on the number of units and reflectors to be used, in the poultry house. These specify one unit to each 200 square feet of floor space, placed six feet from the floor and ten feet apart along a line midway between the front of the house and the front of the dropping board. A 40-watt Mazda is recommended by Cornell University while a 100-watt lamp is specified by Oregon Agricultural College. Cornell recommends a 12-inch R.L.M. reflector for the 40-watt lamps and Oregon a 60-watt reflector for the 100-watt lamp. Each provides as an alternate, a cone-shaped reflector made of galvanized iron, four inches high and 16 inches in diameter. Such a reflector can be made by any tinner, with a shade holder soldered to the point of the cone and the under side of the reflector painted with three coats of aluminum bronze.

The exact method for placing the new ultra-violet lamps has not as yet been determined since it is necessary for the birds to assimilate the ultra-violet light through the legs or head. Aluminum reflectors are recommended for use with lamps of this type.

Switches used for turning the lights on or off or both are available in a wide range of prices. The simple alarm clock is most frequently used where only one operation is necessary. Many ingenious arrangements are in use at the present time for operating a single or double-pole switch with an alarm clock, but practically all of them involve the action of the alarm key in some manner. A very satisfactory method employs a stiff piece of wire, door spring, single-pole switch, and clock with rigid alarm key. One end of the wire is fastened to the wall of the poultry house and the free end rests on the alarm key to hold the switch open. As the alarm key revolves, the free end drops allowing the spring to close the switch and turn on the lights. Many commercially produced time switches are available, one of which includes a dimming device. Except where morning and evening lights are used a clock which will turn on and off twice daily is not needed.

Methods of Dimming

Dimming devices are not particularly important except for the poultryman who employs some form of evening lighting. A very common method used is to install a second line of lights in which several low wattage lamps are used. These lights are turned on when the bright lights are turned off and then turned out after the birds have gone to roost. Another method used is to install a series-

Inexpensive commercially produced time switch used for turning on lights in Indiana poultry house.

parallel system of lighting. A third method of dimming is to install some form of rheostat in the line, adjusting this manually so as to produce the desired amount of dimming. A very simple method has been employed by the author on the Purdue University Poultry Farm and two commercial poultry farms to produce dimming. This consists of a coil of copper wire with a movable core of iron wires. The coil is installed in series with one of the light wires. A single-pole switch which connects both poles of the coil acts as a shunt so that the coil is not ordinarily in the line when the lights are in use. To produce dimming, the switch is opened and the core moved in or out of the coil to obtain the desired intensity.

Bulletins Available on Artificial Illumination

Bulletins which report results of experiments or make recommendations on the use of artificial illumination to increase egg production which may be of interest to the reader follow:

"Artificial Illumination of Poultry Houses for Winter Egg Production," Bulletin 90, Cornell University, College of Agriculture, Ithaca, New York.

"The Use of Artificial Lights on White Leghorn Pullets," Bulletin No. 151, University of Delaware, Agricultural Experiment Station, Newark, Delaware.

"All-night Light for Layers," Bulletin 476, Ohio Agricultural Experiment Station, Wooster, Ohio.

"Artificial Lighting for Poultry Houses," Ohio State University, Agricultural Extension Service, Columbus, Ohio.

"Science Tests Poultry Practices," Reprint from 1930 report, Oklahoma Agricultural Experiment Station, Stillwater, Oklahoma.

"Electric Lights for Increasing Egg Production," Station Bulletin 231, Oregon State Agricultural College, Agricultural Experiment Station, Corvallis, Oregon.

"Methods of Dimming Lights for Poultry Houses," Popular Bulletin No. 134, State College of Washington, Agricultural Experiment Station, Pullman, Washington.

Time switches which may be used for turning lights on or off or both in poultry houses are made by the following concerns:

Anderson Mfg. Co., Boston, Mass.
Automatic Electric Mfg. Co., Mankato, Minn.
R. W. Cramer & Co., N. Y. C.
Edison G. E. Appliance Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
J. E. Gilson Co., Port Washington, Wis.
The Hartford Time Switch Co., New York
Lyon Electric Co., San Diego, Calif.
Paragon Electric Co., Chicago.
Reliance Automatic Lighting Co., Racine, Wis.
Sangamo Electric Co., Springfield, Ill.
Tork Company, New York
Warren Telechron Co., Ashland, Mass.

Reflectors which are suitable for use in poultry houses are manufactured or sold by these companies:

Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Curtis Lighting Co., Chicago, Ill.
Ivanhoe Division, the Miller Co., Meriden, Conn.
Pittsburgh Reflector Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Essentials in the Installation and Operation of a Motor Driven Brush for Cleaning Milk Bottles

By H. S. HINRICHS

PERHAPS one of the most annoying outlets on any farm wiring system is that for the motor operating a bottle brush in a dairy room. It is important that the control for such a motor be accessible to the operator for the frequent starting or stopping of the motor. At the same time it is equally important that current carrying wires or switches be kept away from the tubs because of the severe moisture conditions which hasten breakdowns in the insulation, and of the hazard that is created to the operator who is in direct contact with a good ground thru the water in the tubs.

A Typical Installation

An effective, yet low cost arrangement which satisfactorily meets these requirements is found in the dairy room on the Zinn Bros. Dairy farm near Topeka. A pull switch is mounted on the ceiling so that the cord from the switch is convenient to the man operating the brush. The motor, too, is mounted away from the tubs and protected by a splash board. The wiring is all concealed in the wall.

Standard Parts Used

All of the materials used are standard wiring units available on the market. The switch is a ten ampere, single pole pull switch for ceiling mounting regularly equipped with sufficient cord for normal height ceilings. An ordinary pull chain socket is not suitable for this purpose because it does not have sufficient current carrying capacity to stand up under the motor load, nor is the pull merchanism rugged enough for the job.

This plan has effectively eliminated the frequent motor and switch repairs formerly required while at the same time increasing the safety and convenience of the installation.

Set-up for motor driven bottle washer. Note ceiling switch and switch cord.

BOB'S PAGE

Devoted to Merchandising of Electrical Equipment in Rural Communities

Conducted by Robt. J. Fulton

Prolonging the Life of Your Motor

THE overload capacity of a motor is determined by the operating temperature. High temperatures break down the insulation quickly. Low temperatures do not affect it. It is, therefore, obvious that the life of a motor depends to a great extent upon the intensity of the heat the insulation is forced to radiate. All standard general purpose motors have guarantees to carry their rated load with a temperature rise (above room temperature) not to exceed 40 degrees Centigrade (104 degrees Fahrenheit) on the windings. Some motor manufacturers design their motors to just barely come within this guarantee of 40 degrees while some try to have theirs stay around 25 degrees Centigrade (77 degrees Fahrenheit) above room temperature.

What is a fuse?

A fuse is electricity's safety valve. Like a steam safety valve, it not only warns of trouble but it actually prevents damage when trouble does occur. It is a device designed to interrupt the flow of current in an electrical circuit. Whenever the amount of current flowing through a line becomes abnormally great, the fuse is the part affected. It is purposely made the weakest link in the system or circuit in order to protect by its weakness other more expensive parts of the circuit.

Why is such a safety valve necessary?

Electrical energy must be dissipated in the form of heat or power. If we were to connect a copper wire directly across two wires of an electric circuit, the electrical energy would all appear in the form of heat, and under ordinary conditions the weakest point would burn out. In so doing, it would draw a very dangerous arc, due to the vaporizing and burning of the copper wire. That is what is known as a short circuit.

A Dangerous Practice

Overloading a wire means permitting a greater amount of current to pass through it than that for which it was designed. The result is that the wire overheats and subsequently destroys or burns off its insulation, setting fire to any readily combustible material that comes in contact with it.

Overloading a motor means not only that the motor is mechanically overloaded, but also that the windings are electrically overloaded. This is due to the fact that the more load a motor is required to carry, the more current it requires.

Breaks Down Insulation

This increase in current causes excessive heating which will result in the destruction of the insulation, or of the soldered connections, or actual burning out of the wires themselves. Any of these results would render the motor useless.

To guard against these conditions, every electrical circuit must be carefully equipped with fuses. In addition to this, all electrical apparatus, such as motors, should be individually protected by fuses.

When a fuse blows, there is trouble on the line. Of course, I assume the fuse is of standard make.

Hunt for trouble. Do not put in a new fuse until you find out just where the trouble originated. If a temporary overload blew the fuse, install a new one and proceed. Do not resort to the expedi-

ent of installing new fuses that are too large because continuance of the overload might, in a short time, burn out the motor.

If the fuse is protecting a motor, it may be one of the following causes that resulted in its blowing:

Stiff belt, or dry or tight bearings.

Commutator not clean.

Motor being brought up to full speed too quickly.

Motor started under too heavy a load.

Brushes not in neutral position.

Poor contact in fuse block.

Do not put in larger fuse than is necessary. Be sure you have fuses of a reliable make as your motor will give you service and performance if you will give it but a fighting chance.

Kelvinator Room Cooler

The Kelvinator Corporation of Detroit, Michigan, is now offering a room cooling unit. The heat transferring unit is installed in a one-piece art metal finish cabinet resembling a radiator cover. The cooler is of the dry system type and consists of three rows of annular finned tubing in parallel with each other and connected at each end with a manifold. Two centrifugal type, quiet operating fans draw air in through an opening in the lower part of the front of the case and force it up over the cooling unit and from there out through louvred openings in the top and into the room. The louvres are so arranged that the direction of the air current is upward and outward, which tends to promote the maximum of circulation of air in the room which is being cooled.

Under ordinary conditions one cooler unit will give satisfactory results in rooms having up to and including 300 feet of floor space. For rooms having a greater floor space than 300 feet, additional units should be added according to requirements.

Benjamin Announces Line of Farm Reflectors

The Benjamin Electric Mfg. Company of Des Plaines, Illinois, now offer a line of reflectors conveniently packed in unit cartons especially for the farm trade. Three types of reflectors are available—the Dome Reflector, the Angle Reflector, and the Ultra - Violet Reflector. Each package includes complete equip-

The electric brooder is featured in this window display of the Pacific Power & Light Company at Yakima, Washington.

ment, piping, hood, wall brackets, etc.,—all ready for installation.

The Benjamin Company are anxious to co-operate with power companies and dealers in the development of this important phase of the business. They'll gladly furnish details to any who express their interest by writing.

Roper Water Systems

In listing automatic water system manufacturers at the conclusion of the article on "Water Systems" under the departmental head "Rural Salesmen's Forum," page 84, of the August issue, the name of the George D. Roper Corporation of Rockford, Illinois, was inadvertently omitted.

Time Switch Consolidation

The recent litigation in the time switch field has finally been settled out of court to the apparent satisfaction of all concerned. Also a new selling combination has been launched to market a complete line of time and temperature controls including Tork Clocks, Horolectric Time Switches, Hartford Time Switches, Welsbach Time Controls, Chielmetti and Novitas Swiss Made Time Switches and General Automatic Time and Temperature Controls.

General Automatic Controls, Inc., with executive offices at 12 East 41st Street, New York, markets all of the above lines.

This consolidation of interests is believed to place the several manufacturers involved in a very strong patent position on the latest forms of time switches and similar controls.

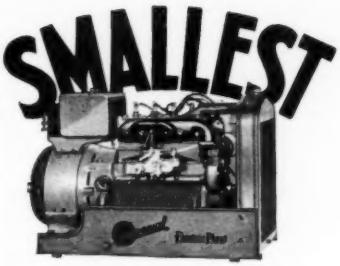
All the above manufacturers have authorized the Time Controls Repair Corporation, 116 West 14th Street, New York, to handle repairs and replacements on all the kinds of time and temperature controls. In addition, the Time Controls Repair Corporation protects the factory guarantees on all lines sold by General Automatic Controls, Inc.

COMING MEETINGS

NATIONAL ASSN. OF FARM EQUIPMENT MANUFACTURERS. Thirty-eighth annual convention October 21-23, 1931 at Chicago, Ill.

OHIO STATE SHORT COURSE. State Short Course to be held at Ohio State University, Nov. 5, 6, 7, 1931.

AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS (North Atlantic Section) Meeting to be held at New Brunswick, N. J., October 15, 16 and 17. Further information may be secured from E. R. Gross, Prof. of Agricultural Engineering, Rutgers University, New Brunswick, N. J.



4 Cylinder

Electric Plant

Direct or Alternating Current

Here . . . in either AC or DC current . . . is the smallest, self-contained, 4-cyl. Electric Plant unit available.

It has a highly efficient cooling system . . . runs unusually quiet . . . renders constant, dependable service . . . and generates steady, flickerless current.

This new Universal AU Series is made in three sizes—1, 2 and 3 K.W. Voltage can be furnished 32, 110 or 220. Can be used with or without storage batteries. Auto type starting or remote control as desired. Prices are attractively low.

Universal Electric Plants are in use throughout the world — on land, sea and even in airships. Models ranging up to 35 K.W. are available for every type of electric power or lighting service.

Complete literature on request of Dept. 53, Universal Motor Company, Oshkosh, Wis., U. S. A.

Universal MOTOR COMPANY

Air Lift Water Systems

By W. T. Dean

Wherever rural electric lines are spread, wherever the tank truck rumbles by, anywhere a flivver can go, there running water may be had in abundance at a reasonable cost.

For shallow wells automatic electric pumps delivering sufficient supply may be had for $75 or less. For deep wells the cost is a little greater but the supply no less certain or less economical.

One of the types used utilizes the air lift, or the "Air Power Water System." The power plant is either a motor or gasoline engine driven air compressor, such as is used in every roadside garage. Air is pumped into a tank and held there at 75 to 125 ibs. pressure. The compressor need be run only occasionally, yet the compressed air is always available to lift water from the deep well, from a shallow cistern or from a distant spring.

The installation of a modern pumping system on the farm or ranch provides water for every purpose from a single plant which may be located in any convenient place.

One or several pumps may be operated from the compressor, often a 4" or 6" pump is installed in a deep well casing for drinking water while a 6", 8" or 12" pump is placed in a cistern for soft water or in a spring or distant stream.

Both the air and water lines may be buried well below the frost line so that water is always available no matter what the weather may be.

Conveniences For All

A plentiful water supply permits the use of modern toilet conveniences, eliminating a prolific source of colds, exposure and danger of contamination. Septic tanks are inexpensive, simple, easily installed and by bacterial action automatically dispose of all sewage with entire absence of objectionable odors thus removing the worst source of the house fly nuisance.

No one thing which has brought cheer and comfort to the farm home equals the supply of fresh, pure water with its train of conveniences in the kitchen, toilet and

The water system installation on the farm of George Tabbert, Ripon, Wisconsin.

bath for its blessing extends from the home through every phase of farm life even to irrigation for the kitchen garden and sprinklers for the lawn. Last but not least, a plentiful supply of water removes that terror of the farmstead, the deadly fire in the night, for automatic sprinklers properly located will check any accidental blaze before it can get beyond control.

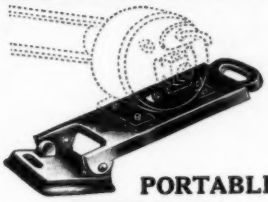
Illuminated Alarm Clock

The Telalarm, a self-starting illuminated electric alarm clock, has just been announced by the Warren Telechron Company of Ashland, Mass. The case of this new timekeeper is of modern design and made of Dura-silver alloy, with a moulded black Bakelite base. The "butler-wiped" finish of the metal case will not tarnish.

The dial of the Telalarm is illuminated by means of a small Mazda lamp shining through a diffusing glass. The intensity of the illumination may be varied as desired by means of a rheostat. The clock measures 5 inches high by 4¼ inches wide and 3 inches deep, and is equipped with an eight-foot silver gray cord, permanently attached.

Harding Liquid Level and Tank Alarm Float Switch—Leonard H. Harding, 4818 Bay Parkway, Brooklyn, N. Y., has issued a circular illustrating and describing the liquid level control and tank alarm float switch which is designed to give a high and low liquid signal for surge tanks, gravity tanks, cisterns and reservoirs. It may also be used for auxiliary control of pump motors. The float switch will give a low signal when the liquid drops to 6 inches below the required level and another signal when the liquid has been restored to high level.

BRILLION-BEVAN



PORTABLE MOTOR BASE

With it you can use one motor to operate your grinder, washing machine, vacuum pump sausage grinder, line shaft, or any other installation which requires ½ H.P. or less to drive it. Write for prices.

One feature of high-grade line of Electric Farm Equipment.

ELECTRIC PUMPERS—PUMP JACKS—WATER SYSTEMS—GRINDERS

BRILLION IRON WORKS
Brillion, Wis.

Patronize our Advertisers

These manufacturers are helping you to break down sales resistance and deserve your support.

Less Expense—Better Service

when you place the farm meter out of doors, on a pole, in a central location.

"UTILITY"
METER AND SWITCH BOXES
AND METER SERVICE SWITCHES

are specially built for this purpose. Made of galvanized sheet steel—weather proof—easily mounted and wired. Write today for catalog and our free trial offer. There are thousands in service.

F. D. KEES MANUFACTURING CO.
BEATRICE, NEBR.

New BENJAMIN

Farm Lighting Equipment

Dome or Angle Reflector

For 75 or 100-watt Lamps

Durable Porcelain Enameled Steel. Will maintain its high lighting efficiency indefinitely. For improved lighting of barns, stables, milk houses, drives, yards, etc.

Conveniently Packed

ONE TO A CARTON

including reflector, 17½-inch length of ½-inch pipe, hood and wall bracket.

Ready to be Wired and Installed

Type "CX"

Ultra-Violet Reflector

For the Maintenance of Health and Prevention of Rickets

For Poultry and Animal Husbandry

This new Benjamin Unit has been developed to provide an efficient reflector for the 300 and 500-watt Mazda CX lamps which supply, in addition to light for seeing, a quantity of biologically-effective ultra-violet radiation for health maintenance purposes.

Write to Sales Promotion Department for Installation Details and Suggestions for Developing the Farm Lighting Field.

BENJAMIN ELECTRIC MFG. CO.

General Offices and Factory

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